Exploring the Relationship between Innovation and Job Quality: Evidence from China

by

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Declaration

The candidate confirms that the work submitted is her own.

The author also confirms that the thesis has not been submitted for a degree at another university.

Abstract

Previous research indicates a potential relationship between innovation and job quality, but no relevant study has been conducted in China. This thesis examines the relationship between innovation and job quality in China. Employing a mixed-methods approach, the research proceeds in two stages. First, it makes statistical analysis of secondary data to assess levels of innovation and job quality in different Chinese industries, and populates them into a four-quadrant matrix, in order to help identify case study industries. Second, it conducts qualitative interviews, with eight enterprises in four industries, to investigate innovation, job quality and their relationship at company level. The study finds variations in innovation and job quality among Chinese industries, and a two-directional positive relationship between innovation and job quality in China, indicating that a virtuous cycle can be generated with innovation and job quality improving each other, through different mechanisms and channels. This research is the first attempt to investigate the relationship between innovation and job quality in China, and contributes to current understanding in four ways: an empirical contribution being the first study of the topic in China; a methodological contribution in using a mixed-methods approach linking innovation and job quality to study their relationship in China; a theoretical contribution to the understanding of the relationship between innovation and job quality in China; and a practical contribution with policy recommendations for promoting innovation and job quality in China.

Chapter 1. Introduction

The links between innovation and job quality have been indicated in recent research. For instance, Warhurst and Wright (2014) point out that innovation and job quality are related, in that some of the same variables apply, and that synergies between them can be created, as they might share practices and reinforce each other. In addition, research in different contexts finds various relations between innovation and job quality, in terms of certain types of innovation and certain aspects of job quality (e.g. Yuan and Woodman, 2010; Bysted, 2013; Dailey et al., 2015; Chen, 2017; Delmas and Pekovic, 2018). However, a comprehensive investigation of the relationship between innovation and job quality is lacking, as previous research did not analyse the overall relationship. Moreover, no prior study has been conducted to explore this topic comprehensively in China. The QuInnE (Quality of jobs and Innovation generated Employment outcomes) project, running from 2015 to 2018, systematically investigated how job quality and innovation impact each other across seven European countries (QuInnE, 2015). Therefore, being similar in the time frame but different in its context, this research in China is conducted in parallel with the QuInnE project. The rationale for this research is that the absence of relevant research in China, as well as the limited knowledge of the whole topic in the literature, leads to a need to investigate the overall relationship between innovation and job quality in China, a country where innovation has become vitally important and job quality has been improving.

In order to better explore the relationship between innovation and job quality in China, this research adopts a mixed-methods approach, in consideration of the data availability in China. First, a statistical analysis is made, to examine the relative levels of innovation and job quality in different industries in China, and help identify industries of interest for the following qualitative research. Second, interviews within case studies are conducted in order to gather detailed answers regarding the relationship between innovation and job quality in China at the organisational level. This research mainly finds variations in innovation and job quality among Chinese industries and a two-directional, positive relationship between innovation and job quality in China, indicating that a virtuous cycle can be generated, with innovation and job quality improving each other through different mechanisms and channels.

This research contributes to the existing literature in terms of four aspects. First, it provides the first empirical study in China to explore the relationship between innovation and job quality. Second, it applies a mixed-methods approach, linking innovation and job quality to study for the first time their relationship in China. Third, it advances the theoretical knowledge of the relationship between innovation and job quality, mainly by providing models that offer a more comprehensive understanding and detailed mechanisms by which innovation and job quality are related in the Chinese context. Fourth, it provides practical suggestions that have been proven to work successfully in improving innovation and job quality in China.

1.1 Research background

After around 40 years of economic reforms and having transformed from a low-income to an upper-middle income country, China now faces significant challenges in moving from imitation to innovation. The central government has laid the groundwork for a more innovative economy with a series of medium-to-long-term initiatives. The success of this transition will be of great importance in enabling China to keep its competitive advantages and sustain its long-term economic growth (Simon, 2013; Wu, 2013). As the world's second-largest economy, China on the one hand stresses innovation in its policy: this is shown in the establishment of an indigenous and open innovation-oriented economy, achieved by enhancing science and technology innovations through major objectives ranging from innovation facilities, key industries, innovation capacity and regional innovation, to the innovation environment (State Council, 2013). On the other hand, job quality in China has changed greatly due to the changing employment arrangements and management focus, in which the fixed jobs and personnel management in the old model of the planned economy are replaced by the contract-based arrangements and human resource management in the new model of the socialist market economy. Moreover, both the Chinese innovation policy and human resource management emphasise the importance of talents or human capital, as well as the investment made in them, given that they are valuable resources for the generation of innovation and better economic performance. Therefore, as China no longer competes on price and low labour cost but on the advancement of technology and high value-added products and services, innovation and job quality have become two important issues for the China's current and future development.

Innovation and job quality have been widely emphasised by many countries and organisations in the world, drawing special attention in the policy arena. Regarding innovation, it is generally agreed that innovation plays an important role in the continuous development of the economy and society. Key international organisations, such as the OECD (Organisation for Economic Co-operation and Development), EU (European Union), and UN (United Nations) have released policies aiming at strengthening innovation in different contexts. While the *OECD Innovation Strategy 2015* intends to strengthen the performance of innovation and promote stronger, greener and more inclusive growth (OECD, 2015a), the Innovation Union from the EU plans to make Europe into a leading science performer, to overcome barriers to innovation, and to strengthen cooperation between the public and private sectors. This will be achieved through innovation partnerships, in order to achieve the goal of smart, sustainable and inclusive growth, as stated in the *European 2020 Strategy* (European Commission, 2010a). In terms of job quality, the OECD stresses promoting job quality in developing countries, whilst the EU aims to create more and better jobs in member countries (Peña-Casas, 2009; OECD, 2015b). The EU also believes that innovation and job quality need to be integrated in policy and workplace practice, though they are treated separately at present (European Commission, 2017). The QuInnE (Quality of jobs and Innovation generated Employment outcomes) project by the European countries was specifically conducted to investigate the issues relating to the relationship between innovation and job quality, and facilitate the development of relevant policy in the EU.

In the academic field, recent research indicates a potential relationship between innovation and job quality, as the same variables are often adopted in the studies of the two (Warhurst and Wright, 2014). Warhurst and Wright (2014) suggest that innovation and job quality might both share practices and reinforce each other, creating synergies. Research in different countries and contexts has revealed links between innovation and specific aspects of job quality, such as rewards and pay, work pace and schedule flexibility, training, and subjective perspectives (Yuan and Woodman, 2010; Bysted, 2013; Dailey et al., 2015; Chen, 2017; Delmas and Pekovic, 2018). However, the analyses in these studies have been confined to the relations between certain types of innovation and specific aspects of job quality. Therefore, research on the overall relationship between innovation and job quality is lacking. More recently, the QuInnE project has examined the topic more widely, but only in the European context; whereas in China, no prior research has been conducted on the topic so far. For instance, it is unknown whether innovation and job quality interact with each other in China, and whether there are positive or negative influences between the two. Consequently, there is a gap in knowledge; in such a background, this research is designed to solve the problem and explore the relationship between innovation and job quality in China.

1.2 Research questions and objectives

According to the gap in knowledge identified in the first section, the main purpose of this research is therefore to investigate the relationship between innovation and job quality in China. This research topic focuses on innovation (including various types of innovation), job quality (including various aspects of job quality), and their relationship in the Chinese context. The main research questions in this research are: 1) What is the relationship between innovation and job quality in China? 2) Why does such a relationship exist? 3) How do they affect each other? The first research question asks whether there is a relationship between innovation and job quality, and if yes, whether it is a positive or negative relationship. The second question explores the reason why the particular relationship between innovation and job quality discovered in China exists. The third question considers the detailed interactive impacts and mechanisms that operate between innovation and job quality.

There are four key objectives of this research: 1) to establish a mixed-method approach linking innovation and job quality, in order to investigate their relationship in China; 2) to explore the current state of innovation and job quality, and the interactive relationship between them in China; 3) to develop a theoretical model to help better understand the relationship between innovation and job quality in China; and 4) to provide policy recommendations for promoting innovation and job quality in China.

In summary, the proposed research is aimed at reaching a better understanding of the relationship between innovation and job quality in China. With the development of theoretical frameworks for analysing innovation and job quality in the Chinese context, followed by mixed methods including statistical analysis and interviews within case studies, the research tries to achieve a theoretical understanding mainly through an inductive approach, and to give suggestions of better practices for levering high innovation and high job quality in Chinese enterprises.

1.3 Significance of the research

This research is the first attempt to investigate the relationship between innovation and job quality in China. The significance of this research lies in the following five main aspects.

First, innovation plays a central role in China’s economy and has become a key policy focus. Thus, it is essential to examine the issue and analyse the current state of innovation in China, including levels of innovation, types of innovation, and differences in innovation across industries and enterprises. The results and suggestions regarding innovation are important for China, which wants to promote innovation as a source of continuous growth. Also, the exploration of the relationship between innovation and job quality has the potential to indicate supplementary approaches that can help boost innovation in China.

Second, a significant number of Chinese policies indicate a trend of improving job quality and a recognition of the importance of human capital, especially the higher-level talents, because they are regarded as vital assets to China's innovation and economic development. However, no study has previously been conducted before to systematically investigate job quality in China. Thus, it is meaningful to explore the issue and capture the situation of job quality in China. The findings and recommendations regarding job quality in this research can provide useful sources for the improvement of job quality policies in China. Moreover, the study on the relationship between innovation and job quality also provides more perspectives to promote job quality through mechanisms linking job quality to innovation.

Third, key international organisations such as the OECD and EU commonly stress higher innovation and better job quality in their policies, and relevant research suggests the two can work together. But in China, nothing has been done about the relationship between innovation and job quality, and no policy has been established to lever innovation and job quality mutually. Therefore, it is of great significance to conduct relevant research in China and compare the Chinese research findings with those in other areas. This research not only generates unprecedented knowledge of the topic in China; it also adds to understanding of the topic by providing evidence from the distinctive context of China, which is comparable to other research in the existing literature.

Fourth, the findings of this research are important to the development of relevant policies on innovation and job quality in China. As mentioned earlier, the EU conducts relevant research through the QuInnE project, in order to explore the relationship between innovation and job quality, and the mechanisms that can be accelerated to deliver more and better jobs, which in turn help tackle social exclusion and inequality (European Commission, 2017). Similarly, this research helps identify effective mechanisms and strategies that can promote both innovation and job quality in China. Based on the findings of this research, relevant policies can thus be developed and applied in order to boost innovation and job quality in China.

Fifth, apart from the practical significance mentioned above, this research also advances the theoretical understanding of innovation and job quality in the literature. Previous studies indicate distinctive relations between certain types of innovation and certain aspects of job quality, but they are observed in different contexts of countries, industries and enterprises. Therefore, such studies are segmented, providing no indication of the overall relationship between innovation and job quality. Moreover, research on the relationship between innovation and job quality is lacking in China. To support the development of this theory, this thesis establishes an analytical framework for constructing the first empirical study to explore the overall relationship between innovation and job quality in China. It is a more comprehensive research than previous studies, as it covers different types of innovation and various aspects of job quality. It investigates the relationship across different Chinese industries and enterprises, making comparisons and conclusions. It advances theory mainly by providing better understanding of the causal relationships between innovation and job quality; it also indicates various direct and indirect mechanisms by which innovation and job quality are related in the Chinese context; furthermore, it draws distinctions among different innovations and job quality aspects, to clarify the relationship between the two.

1.4 Structure of the thesis

This thesis consists of nine chapters. This chapter has introduced the background of this research, the research focus and research problems. It has also identified the purpose, main questions and objectives of this research. It then goes on to justify the significance of the research and introduces the structure of the thesis.

The next chapter, Chapter 2, reviews the literature regarding the Chinese business system, management and employment, thus providing an important context for the research in China. This chapter begins with theoretical models that use different approaches to identify distinctive economies at national level, and business systems at a micro level. The various models provide a theoretical foundation for exploring the Chinese model, and draw distinctions in terms of innovation and job quality between different economies and organisations. The chapter then discusses the changing model of China. A comparison between the labour law and economy in China and Shanghai is also included, as Shanghai is the geographic focus of the case studies in this research.

Chapter 3 focuses on innovation and discusses the innovation policy, theory and model. First, it refers to the various innovation policies, and identifies the main focus of the innovation policy in China. Second, as policies highly stress innovation, this leads to the question of what innovation is; it then examines the innovation theories in the literature. Third, it discusses the innovation model and the research focus of innovation. An analytical framework for innovation is generated, including indicators to help measure innovation.

Chapter 4 focuses on job quality through a discussion of job quality policy, theory and relevant models. First, it reviews and compares job quality policies in different contexts. Second, the growing popularity of promoting job quality in policy-marking triggers the exploration of the definition and measurement of job quality. Hence, the chapter then discusses the theory of job quality. Third, based on the conceptual foundation and the data availability in China, it develops a job quality model, including indicators for analysing job quality in this research.

Chapter 5 explains the research methods used in this study and offers a research design that helps answer the research questions and achieve the research objectives. It starts by considering the various research philosophies and methodologies. Through evaluation of different approaches and methods, a decision is made on the methods adopted in this research. According to the methods chosen, it then addresses the research design, in order to generate more specific and practical strategies for the research to be carried out.

Chapter 6 presents the statistical analysis of innovation and job quality in China at industry level. This chapter achieves three goals, the first of which is to identify the overall levels of innovation and job quality in different industries. The second goal is to draw different configurations between innovation and job quality among Chinese industries, and thus form a typology for Chinese industries. The third goal, based on the first two, is to identify appropriate industries where the subsequent qualitative research can be conducted.

Chapter 7 analyses the findings of interviews conducted within case studies at enterprise level in China. The interviews investigate eight enterprises from four industries. The chapter then presents the results by industry, covering innovation, job quality, and their relationship. The interviews explore the dynamics of innovation and job quality, as well as their interactions, in different enterprises and industries, in order to acquire more insights that explain how and why such a relationship exists. Through discussion, theoretical models are finally generated to help understand the relationship between innovation and job quality in China.

Chapter 8 makes an overall analysis of the innovation and job quality in China by discussing the new empirical findings for China in the context of the existing literature. The chapter first returns to the literature, and re-emphasises the research gap and objectives in the research. It then analyses the key issues about the findings. Finally, it further discusses and compares the findings with relevant research in the literature, aiming to move the analysis forward.

Chapter 9 is the concluding chapter, which draws conclusions on the work achieved so far. These conclusions mainly concern five aspects, including the purpose of the research, the major findings of the research, the key points and the contributions of this research, the strengths and limitations of the research, and recommendations regarding further research and future work.

Chapter 2. The Chinese business system, management and employment

This chapter begins by examining theoretical models which adopt different approaches to identify political economies at national level, and business systems at a more micro level. The various models provide a theoretical foundation for the discovery of the Chinese model of economic organisation, and they draw distinctions in terms of innovation and job quality between different economies and organisations. By using a mixed approach containing various analytical perspectives, the following section on China traces the route from the old model to the new model, emphasising how it has caused changes in institutions, business systems and management. The third part examines the labour laws in China and local labour-related laws in Shanghai (a municipality of China), as well as China's economy. By analysing and comparing the labour law and economy of China and Shanghai, a conclusion is drawn on characteristics of Shanghai, and how it relates to and differs from China as a whole.

2.1 Summary of theoretical models

There are various ways of building models for capitalism and business systems, which focus on different perspectives. However, two main theories are currently regarded as being the most popular. One is the approach of "varieties of capitalism", which identifies two types of distinctive economies and explains how they perform differently through different levels of coordination among organisations. The other approach, "business systems" by Whitley (2007), looks deeper into the company level; this approach is frequently quoted and referred to by scholars and researchers. Therefore, the following section starts by describing the theory of “varieties of capitalism”, before moving to the “business system”; it then reviews another approach, by Stanford (2015), who discusses both capitalism and socialism. Finally, it provides some discussion and conclusions.

2.1.1 Varieties of capitalism

The “varieties of capitalism” approach, which links business studies to comparative political economy, was developed from three dominant perspectives on institutional variation that previously existed in the study of comparative capitalism (these were Shonfield’s (1965) “modernisation approach”, an approach based on “neo-corporatism”, and the “social systems of production” approach). However, instead of focusing on institutional structures, trade union movements or the behaviour of firms, the new approach places firms at the centre of the analysis, laying emphasis on “variation among national political economies” (Hall and Soskice, 2001: 4). According to this approach, there are five important spheres in which firms must solve coordination problems that relate to their core competences. These are “industrial relations”, “vocational training and education”, “corporate governance”, “inter-firm relations” and “employees” (Hall and Soskice, 2001: 6-7). By considering how different nations act in terms of these five spheres, distinctions can be drawn between them.

Two typical models of political economy are identified among developed countries, namely the “liberal market economies” (LMEs) and the “coordinated market economies” (CMEs). The former normally coordinate their activities through “hierarchies and competitive market arrangements”, characterised by market competition and formal contracting. By contrast, firms in CMEs rely on non-market cooperation through “more extensive relational or incomplete contracting”, “network monitoring” based on shared private information, and “collaborative relationships”. Therefore, the equilibrium outcomes of these two economies are decided respectively by demand and supply in LMEs, and strategic interaction among actors in CMEs (Hall and Soskice, 2001: 8).

According to Hall and Soskice, distinctive institutional frameworks trigger differences in corporate strategy across liberal market economies and coordinated market economies. In general, investments in CMEs are more likely to be made in “specific” and “co-specifc assets” (e.g. industry-specific training, collaborative research and development) because of adequate institutional support for strategic interactions; while “switchable assets” (e.g. general skills, multi-purpose technologies) are more favoured in LMEs where markets are more fluid (Hall and Soskice, 2001: 17). Accordingly, Germany and the US are two typical cases of CMEs and LMEs, both having features of their respective subsystems. Some features of Germany include easy access to “private” or “inside” information, consensus decision-making, strong business associations and a publicly subsided training system. The US, on the contrary, gives weight to publicly assessable information, top management’s unilateral control, macroeconomic policy and market competition, in-house training, and a standard market relationship and formal contracts under antitrust regulations (Hall and Soskice, 2001: 21-33).

Apart from corporate strategies, distinctive models of political economy also explain the differences in innovation across countries, as well as countries’ interests and actions when confronted with globalisation. Due to characteristics such as “employees’ secure employment, autonomy from close monitoring, and opportunities to influence firms’ decisions, as well as close inter-firm collaboration”, coordinated market economies are better at developing incremental innovation than liberal market economies (Hall and Soskice, 2001: 39). The LMEs, on the other hand, have a more beneficial institutional framework (e.g. high fluidity of labour, few restrictions on mergers and acquisitions) for supporting radical innovation (Hall and Soskice, 2001). In the face of globalisation, countries remain different because of comparative institutional advantages. For instance, trade unions are strengthened in CMEs, but are weakened in LMEs, where deregulation is encouraged (Hall and Soskice, 2001).

With regard to job quality, according to Hall and Soskice (2001), LMEs depend on labour markets that set wages through pure competition and permit very little regulation to protect employees from insecurity. CMEs, in contrast, feature corporatist wage-setting and strongly regulated labour markets (Hancké, 2009). In terms of skills and training, employees in CMEs receive more professional training and acquire higher-level skills than those in LMEs, where high fluidity of labour leads to a preference for general skills and less input on training. Therefore, in this sense, companies in CMEs are likely to have better job quality than those in LMEs, because the former can provide higher levels of both job security and training.

Although Germany and the US seem to fit perfectly into the two model categories, such models alone cannot represent different countries, because countries vary distinctively. Even countries marked equally as coordinated market economies, for example, are not the same. For instance, it is believed that the northern European countries differ from Japan and South Korea in terms of the foundation of coordination established. The former are based on industry, whilst the latter are group-based (Hall and Soskice, 2001); this illustrates the difference between horizontal coordination and vertical coordination. To sum up, the approach of varieties of capitalism provides a valuable indication of how to identify a nation’s institutional framework and business system, as well as the process by which it changes.

2.1.2 Business systems

Compared with Hall and Soskice’s approach, which tends to focus more on the nation as a whole, the approach of the “comparative business systems framework” or “comparative analysis of capitalism” proposed by Whitley (2007) considers at both macro and micro levels. Whitley identifies eight types of business systems from the perspective of levels of ownership integration and alliance integration, with each divided further into dimensions of degree and scope. Thus, distinctive business systems can be classified as “fragmented”, “project network”, “coordinated industrial district”, “financial conglomerate”, “integrated conglomerate”, “compartmentalised”, “collaborative” and “highly coordinated” (Whitley, 2007).

The first two types have a relatively low level of authoritative coordination and control of economic activities. Although the project network business system has some alliance coordination, which is more than that of the fragmented business system, it is nevertheless restricted to certain projects, and tends to operate in the short term. Coordination is normally achieved through venture capital and business lawyer networks (Langlois and Robertson, 1995; Kenney and Florida, 2000; Suchman, 2000), labour unions (Christopherson, 2002), and geographical proximity and technical communities (Grabher, 2002; Heydebrand and Miron, 2002), in order to share information, opportunities for investment, and expertise (Whitley, 2007). The coordinated industrial district business system, in comparison, has a higher level of alliance coordination, both in degree and scope, and more stable relationships; this is often achieved through cooperative marketing and distribution organisations, and technology development consortia. “Collective competition goods” offered by local government and district-based agencies of training, finance, etc., are also shared among companies in this business system (Whitley, 2007: 14).

The financial conglomerate and integrated conglomerate types, on the other hand, represent two typical business systems that are dominated by large, diversified enterprises; these systems vary according to the integration of ownership and alliances between firms. The business system of financial conglomerates has a low degree but high scope of authoritative integration, as well as a low level of inter-firm alliance. With small groups of large shareholders controlling the firm, firms in this business system are called “hollow firms” (Teece et al., 1994). Companies in the integrated conglomerate business system, by contrast, are high in both degree and scope of internal ownership coordination, but are low in external alliances with each other. The compartmentalised business system is similar to that of conglomerates, in terms of high authoritative integration and low inter-firm cooperation. The alliances between firms generally exist in short periods, and are limited to specific deals (Whitley, 2007).

The last two types of business systems, collaborative and highly coordinated, are both dominated by large firms which have diversified into mostly technological and market-related industries. They collaborate with each other, having a broad range of business partners in technology development, training, wage bargaining, etc. They usually have more and closer relationships with investors, banks and top managers than those in the compartmentalised system. However, while the collaborative business system relies more on unified ownership to integrate supply chains within sectors, the highly coordinated business system is based more on alliances and obligational contracting, with a high level of employer-employee commitment in the long run, and on the development of firm-specific skills (Whitley, 2007).

According to Whitley (2007), the differences between business systems lead to varieties of strategies by actors. In the case of national market economies, not all countries have only one business system, nor are all business systems specific to an individual country. The nature of companies, as well as their competences and strategies, often differ between sectors, technological regimes and regions within states, and they can also overlap among states (Breschi and Malerba, 1997; Braczyk et al., 1998; Whitley, 1999; Whitley, 2007). Whitley summarised four types of countries that have distinctive approaches to promoting development, as follows.

Firstly, the “arm’s length states” are apparently different from the other three types in their reluctance to be involved in companies’ behaviour and strategies. Instead, they prefer to establish formal regulations and let the market mechanism decide the outcomes; thus they are similar to Hall and Soskice’s liberal market economies. The remaining three types vary in the way they coordinate with different organisations and associations to develop and implement economic policy, which makes them similar to the coordinated market economies of Hall and Soskice. Secondly, in “dominant developmental states”, industry associations and relevant groups work as “agents of the state”, thereby having low autonomy and no involvement in governmental activities. Thirdly, the “business corporatist states” cooperate closely with large companies’ associations, but also limit their participation when making policy. Fourthly, “inclusive corporatist states”, in contrast, encourage unions at national level to have a voice in policies on income, and they handle some issues for the government (Whitley, 2007: 38-39).

Different types of states and business systems develop different systems in terms of innovation. Whitley (2007) identifies six types of innovation systems (i.e. the autarkic, artisanal, technological teams, state-led, group-based and highly collaborative ones), and relates them to different types of states and business systems accordingly. Artisanal innovation systems, often at the local or regional levels of organisation, rely on institutional infrastructure to encourage inter-firm cooperation in promoting technologies, exploring new markets and acquiring resources. By contrast, autarkic and technological teams innovation systems are usually developed by arm's length states, with supports such as education and training systems, the funding of novel research skills and fields in universities, and the relaxation of anti-trust rules for pre-competitive collaboration; these measures aim to build firm-specific innovation capabilities and technologies (Whitley, 2007). Dominant developmental states, business corporatist states and inclusive corporatist states are believed to have state-led innovation systems, group-based innovation systems and highly collaborative innovation systems respectively. Dominant developmental states often achieve state-led systems by coordinating investment strategies, risk sharing and technical problem solving, as well as underwriting credit provision and guaranteeing sales. Business corporatist states and inclusive corporatist states, in comparison, also have considerable state coordination, but have much greater reliance on business associations, and give of control over resources to science and technological elites through decentralisation. According to Whitley (2007), while business corporatist states collaborate with business associations and individual companies in developing new technologies and improving existing ones, they seldom encourage unions to become engaged in such activities, and typically do not establish national public skill formation and certification systems in collaboration with union federations. Inclusive corporatist states, however, "support more collaborative innovation systems by institutionalising the role of national and regional union federations in economic policy making and implementation and establishing cooperative skill formation systems that encompass a wide range of skills with employers' groups and unions" (Whitley, 2007: 76-77).

In addition, Whitley (2007) points that the differences in institutional frameworks lead to the variations in authority-sharing and organisational careers; these further generate distinct kinds of organisational capabilities, including those for developing cumulative or radical innovations. Specifically, the different institutional features relate to: 1) state support for coordinated development and limits on opportunism; 2) strength of business and employers associations; 3) strength of the market for corporate control; 4) strength of professions and the public education system for certified skills; 5) effectiveness of an employer-union controlled public training system; and 6) segmented, enterprise-based unions and training. These trigger different types of authority-sharing and careers, which are reflected in the degree of delegation and provision of organisational careers in firms (Whitley, 2007). Therefore, the business systems approach by Whitley is linked to two potential aspects of job quality, namely the autonomy and job security.

2.1.3 Stanford's approach

Another approach, that of Stanford (2015), identifies four types of capitalism from the perspective of workers' treatments, the role of the government, and sectoral make-up. Its approach provides a typology of different countries, including in Asian, and it also introduces state socialism, which is relevant to China. The "Anglo-Saxon" model (US, UK, Canada, Australia), which is run by market power, features a small government role, a large financial sector and very unequal income distribution; it generally offers worse conditions for working people than the other three types. The "Continental" model (France, Germany, Italy), described as "mild corporatism", has moderate regulation and a relatively equal distribution of income. The "Asian" (Japan, Korea, China) type, in comparison, has much stronger regulation, described as "paternalist corporatism" (though as shown below, China is still different from Japan and Korea). The "Nordic" model (Sweden, Norway, Denmark, etc.), according to Stanford, is more egalitarian, having a high degree of both regulation and equality in income distribution (Stanford, 2015: 49-51). Therefore, from the perspective of job quality, the Stanford's model regards the "Anglo-Saxon" type to be at the lowest level and the "Nordic" at the highest, with the "Continental" and "Asian" ones placed in the middle. However, despite much consideration of work conditions, Stanford's approach lacks attention to innovation. Consequently, the links between different models and innovation levels are unknown.

Stanford argues that the major alternative to capitalism is socialism; this type of economy, in which decisions are guided by public interests rather than those of private owners, is seen as a more humane economic system. Socialism normally has two essential features: "widespread public or non-profit ownership of enterprises" and "a larger role for economic planning", aiming at maximising public well-being and achieving more stable aggregate performance (i.e. full employment, full use of resources, and translating expanding production into increasing mass incomes) (Stanford, 2015: 383-385).

More specifically, state socialism, from the perspective of comparative politics and sociology, is "a society distinguished by a state-owned, more or less centrally administered economy controlled by a dominant communist party which seeks, on the basis of Marxism-Leninist ideology and through the agency of the state, to mobilise the population to make a classless society" (Lane, 2014: 7). The former Soviet Union and China under Mao's leadership are regarded as state socialist countries, though both have since experienced great changes. State socialism is believed to be an organic type of society, where "politics and economics are fused; society is subject to central administrative direction on the one side, but to public control on the other". According to Marxist-Leninist theory, this duality is resolved through the process of "democratic centralism", in which the Communist Party is crucial (Lane, 2014: 26). In terms of the labour process, state socialism exhibits hierarchy, wage relations and fairly extensive Taylorism, resulting in a lack of control by workers and little genuine reunification of conception and execution (Warhurst, 1998). State socialism is different from capitalism in that the subordination and exploitation of labour in the labour process is intended for the provision of societal needs rather than for generating profits. Therefore, the generation and appropriation of surplus from labour is comparable to that which occurs in capitalism, though the distribution of the surplus is different (Thompson, 1989; Warhurst, 1998).

In summary, different approaches focus on different perspectives and dimensions, and therefore result in distinctive models. However, despite their differences, they have aspects in common. For instance, the "liberal market economics", "arm's length states" and "Anglo-Saxon" model are similar in that all of them are mainly operated by the market mechanism, with less government involvement and coordination. It is believed that the application of combined approaches is better than a single approach, in terms of analysing and identifying a particular model of a country from different angles; this is because different approaches provide different aspects for analysis, thus helping to achieve a more comprehensive model of a country.

Consequently, the question arises: what model best describes China? Although being a socialist country, China has been evolving from a planned economy to a market economy by adopting the mechanism of capitalism. From the perspective of “varieties of capitalism”, on the one hand there is a trend of increasing market competition and formal contracting in China; but on the other hand, the Chinese government plays a role in coordination, and non-market cooperation also exists, due to the prevalence of networks and collaborative relationships that are rooted in traditional Chinese culture (this will be further discussed in the next section). In comparison with typical states like the US and Germany, neither of the two models (LMEs and CMEs) fits into China perfectly, but China might be in somewhere between them. According to Whitley’s definition of four types of states, China is more likely to be an “inclusive corporatist state”, as it has a union at national level (ACFTU: All-China Federation of Trade Union), which has the duty to propose employee-related policy, measures and law, as well as managing and handling various tasks for the government (Acftu.org, 2006). However, unlike the trade unions in Western countries, which represent the rights and interests of workers, the trade unions in China function more as agents of the government, delivering relevant central government policies while playing a role in protecting workers. The approach by Stanford proposes that China has “paternalist corporatism”, but lacks in-depth analysis. Therefore, the next section continues to explore the model of China, and will give a clearer picture of how China has changed.

2.2 Understanding the Chinese model

The various theoretical models of capitalism, such as those developed by Hall and Soskice (2001) and Whitley (2007), provide different economies and business systems in developed countries, but they cannot present China very well. Although China is placed within the model of Asia by Stanford (2015), some significant differences still exist among China, Japan and Korea. The model gives an inductive statement of common features in Asian countries regarding the government's role and wage labour's treatment, but neglects some other important respects as well. Whitley (2007) distinguishes Japan from South Korea in terms of the degree of collaboration between government and business associations, thus regarding Japan as a business corporatist state, with South Korea as a dominant developmental state. Nonetheless, it is still unclear what the Chinese model is. Therefore, a much deeper and broader analysis is required, paying special attention to important facts such as the influence of culture and politics, in order to better identify models of the Chinese business system, as well as how they are likely to change. The exploration of Chinese models adopts a mixed approach by considering both the state level and company level. The mixed approach adopted for analysing Chinese models of economic organisation considers various aspects, including the economy, the business system, management and employment, in order to better reflect China as a unique context, from different layers. The theoretical models discussed earlier focus on different perspectives respectively, and provide useful tools for understanding Chinese models.

Since the reform and opening-up, as well as its participation in the WTO (World Trade Organization), China has experienced great changes, with continuous economic reforms. Accordingly, the Chinese economy, business system, management and employment have undergone transitions from old to new forms. Therefore, the following article starts by presenting the old models of Chinese economic organisation, before moving towards the most recent ones.

2.2.1 The old model

The initial model, known as the "post-1949 Maoist system" of when Chairman Mao led China, followed the Soviet way of industrialisation by adopting a highly centralised product economy model. The administrative relationship between the government and enterprises entailed a prominent government role, as the owner, operator and employer of state-owned enterprises (SOEs) (Chen, 1995). The model involved the dominance of SOEs, with their "iron rice bowl" cradle-to-grave welfare system and relatively equal wages (Child, 1994; 2000). The "three old irons" in the SOE sector were lifetime employment ("iron rice bowl"), centrally administered wages ("iron wage"), and ministry-based appointment and promotion of managerial staff ("iron chair") (Taylor et al., 2003). Planning authorities who held the personnel file allocated the labour to enterprises, in a non-market system where labour was immobile (Sheldon et al., 2011). There was also a system of apprenticeship, where masters usually taught their "offspring" (the trainees) how to do the job (Warner, 1995). Despite the privileged treatment given in dominant SOEs, most people worked in "collectively-owned enterprises" or tilled the land (Sheldon, 2011). Private enterprises were banned in the planned economy. With no recognition of the principle of supply and demand, the market for consumer products was fragmented and limited in coordinating power. Moreover, a rationing system was adopted in order to restrict consumption when there was a shortage of supply, and the state alone set the prices. Under this system, enterprises had neither independent power nor responsibility for management (Chen, 1995).

During this period, Chen (1995) identified two major forms of Chinese companies: the overseas Chinese family business (CFB) and the Chinese state enterprise (CSE), which can be regarded as the typical old models of China. CFBs were owned by families, in which core family members controlled the ownership tightly; while CSEs were state-owned, whereby the CEOs were assigned by the state and were themselves government officials. According to this model, despite the expansion of family businesses, the vast majority of them remained small, with less than 50 employees on average. On the contrary, the CSEs were normally large or medium-sized companies. However, with the economic reform, there was a trend that large enterprise groups of family businesses were increasingly encouraged by the government, and some CFBs had been trying to follow the examples of "keiretsus" in Japan and "chaebols" in South Korea. In terms of the organisational structure, CFBs featured a simple structure, ambiguous rules and low levels of standardisation, with very few ancillary departments that were not directly related to profit-making, such as R&D. CSEs, on the other hand, being overburdened with large bureaucracies, had complicated and rigid organisational structures, and had to support the Party system. However, their structures and rules were also not clearly defined, and CSEs also commonly lacked departments such as marketing and R&D (Chen, 1995). According to Chen, CSEs were dominated and overprotected by the state in terms of industrial material input, market share and financial support (Chen, 1995).

Despite the obvious differences between these two types of companies, which mainly resulted from distinct social systems, they had some similar features in terms of the management process, due to the commonly shared cultural tradition. First, both CFBs and CSEs were controlled by small groups of people (i.e. core family members in CFBs; and CEOs, top managers or party officials in CSEs), who had concentrated decision-making power and key information, especially financial information. There was a large "power gap" between the top layer and their subordinates. Second, loyalty was regarded as a more important factor than the real performance of employees, both in CFBs and CSEs. In most cases, those who were more loyal and had a better relationship with the owners got more rewards than others, due to a lack of clear criteria for employee performance. Third, the "guanxi" (relationship) was highly important for both CFBs and CSEs, in building external networks for business opportunities. Indeed, many CFBs depended on "guanxi" to survive (Chen, 1995: 120-121). Chen (1995) pointed out that the common cultural and religious tradition of Confucianism, which promoted hierarchy and order in society and harmonious interpersonal relationships, as well as the socialist system with Communist domination and a command economic system, led to the formation of Chinese models (Chen, 1995).

2.2.2 The new model

In 1979, the second leader of China, Deng, launched "open door" policies and the "four modernisations" (industry, defence, agriculture, and science and technology) (Smith and Thompson, 1992; Sheldon et al., 2011); he later introduced the "three systems reform" in 1992 (comprehensive labour contracts, performance-linked rewards systems and contributory social insurance) (Korzec, 1992; Warner, 1995; Warner and Ng, 1999; Zhu, 2005). Since then, China has begun a transition from a planned system to a market system, with a gradual reduction of the content and scope of state planning control. Thus, private enterprises are allowed to boom. Thompson (1992:

203) criticises the result of China's reforms in the late 1970s as "disorganised socialism", a hybrid and unstable system, consisting of "the anarchy of the market without the discipline while continuing the dead hand of the command economy" at the same time. Nevertheless, significant advances have been achieved in terms of the relationship between the government and enterprises, and in the development of the market economy. Efforts have been made to continuously improve China's development; and though it still has ownership, the state decentralises decision-making and management to SOEs. By introducing a system of demand and supply, as well as reducing the role of the government, CSEs gradually moved from the product economy to the market economy model (Chen, 1995). The following paragraphs will illustrate features of the new Chinese model in terms of three aspects: governance, management and HR practices.

During this period, Lee (1990) conducted a deep analysis of the model of Chinese state enterprises; this was defined as the combination of the contract management system (CMS), the managerial responsibility system (MRS), and the internal contract system (ICS). In the CMS, state enterprises sign a contract with the state regarding the mutual responsibilities, rights and benefits associated with the enterprises' management. With this contract, the right to manage the means of production is assigned to the enterprises, which are supposed to be responsible for the profits and losses. The CMS emphasises the profit remittance to the state, investment in technical advancement and control of wage-bill growth (Wang, 1987), as well as linking managerial bonuses to the fulfillment of contracts, and legal protection through public notarisation of contracts against manipulation by local state organs. While the CMS separates ownership from management, the MRS separates management from politics. The Party no longer holds supreme power in the enterprise, with its committee's roles being reduced to party organisation and ideological work. The manager assumes power over economic matters, including production, marketing, purchasing, investment, wages and bonus policies, worker training, and use of enterprise funds. Furthermore, the manager can override the management committee in case of an opinion conflict among committee members, including the Party secretary. The ICS is a web of multi-tier subcontracts within the enterprise, and involves the division of main contracts with the state (mostly profit targets, in some cases cost-reduction or output targets) into separate targets for each division. Subdivisions are classified into several types depending on the nature of their inputs and outputs. The ICS emphasises the importance of internal accounting and economic calculations and, correspondingly, the spirit of responsibility among divisions, with an enterprise internal price system constructed to calculate the profits and other economic indicators of each division (He, 1987; Zhang and Zhu, 1987; Gao, 1988; PRC.ESRRT, 1988; Lee, 1990).

Warner and Lee (Sheldon et al., 2011) vindicate three empirical propositions in terms of China's transition towards the socialist market economy. First, as mentioned above, China has moved successfully from a command to a market economy. Second, the employment system is transformed from a "personnel management"-based one to an "HRM-centred" one, resulting in the end of the "iron rice bowl" system and "in-house welfare state" for state-sector workers. Though inequality is increasing, the labour force is growing, with a dramatic increase in private and foreign enterprises. Third, the introduction of the factor market has led to the change from job allocation to a labour market in three stages: the "nascent" labour market in 1980s, the "interim" stage in 1990s, and the "mature" dual labour market after 2000 (e.g. more formalised HR procedures in large firms and more informal ones in small and medium-sized firms, whether indigenous or foreign-owned). The trade unions (e.g. ACFTU: All-China Federation of Trade Unions), the employers (e.g. CEC: China Enterprise Confederation) and the state (e.g. MOLSS: the Ministry of Human Resources and Social Security) constitute a triangular structure which institutionalises the labour market. Unlike trade unions in Western countries, the ACFTU is led by the Chinese government, the Communist Party. It plays a role in protecting the legal interests and democratic rights of workers; guiding them to join the reform of economic and social development; representing them in the management of national, social and enterprise affairs; and helping them to improve quality and skills. As a trade union at national level, it supervises various local unions and industrial unions in China. Although the triangular arrangement is supervised by the Communist Party, it is given more freedom than before.

Figure 2.1 China's transition: from the old to the new organisational model

Old Organisational Model		New Organisational Model
"Three irons":	→	"Three systems reform"
iron rice bowl,		comprehensive labour contracts,
iron wage,		performance-linked rewards systems,
iron chair.		contributory social insurance.
Personnel management	→	Human resource management

In trying to apply the "varieties of capitalism" framework to China, Peck and Zhang (2013) suggest that the Chinese model is a complex and heterogeneous one and one that is better appreciated by way of its paradoxes and contradictions than by reference to some singular logic or form of institutionalised equilibrium. They argue that Chinese capitalism may indeed display a "hybrid" or "alloyed" form, but some of its constitutive elements, like *guanxi* (relationship) are absent from the mainstream varieties of capitalism.

Nevertheless, Chun (2013) points out some key components of the Chinese model, defined as the “socialist Chinese model”. First, the model is based on a socialist state, not a powerful state; and there is a change in government power, which has declined compared with the past. Second, there is a strong and resourceful public sector, securing the economic and fiscal foundation of the country. Third, priority is given to well-being in development, or “minsheng”, which means people’s living conditions and human development. Finally, the social organisation, participation and power is conditioned by and ingrained in the previous three (Chun, 2013). In contrast, Gallagher (2011) argues that China’s reform and openness, as well as its integration into the global economy, resulted in a strengthened Chinese state, a weakened civil society (especially labour), and a delay in political liberalisation. She critises that under such system, workers rights are not protected well by legal institutions, nor does the trade union structure offer effective interest representation of labour. As mentioned earlier, the ACFTU is under the control of government, which is different from the typical trade union conceptualised in western countries. It should be noted that the new model of China contains elements of both strong government and market mechanism rooted respectively in the world of socialism and capitalism. Instead of overstating one aspect, this thesis proposes that the two distinctive features co-exist in today’s China, thus presenting dualism and contradictory in the model. And the model is developing continuously; with establishment of new policies and institutions, it results in fluctuations of the power between the state and the market at different development stages. By introducing the taxonomy of capitalism, Huang (2008) analysed the evolution of capitalism in China in the last three decades, stating that the development moved quickly towards entrepreneurial capitalism during 1980s, but was reversed in 1990s, and today resembles the state-led capitalism that prevails in Latin America.

Zhang and Peck (2016) suggest the "Chinese ways" of capitalism be plural rather than singular, because it had been jointly constituted with a range of regional models due to varying patterns and uneven spatial development within the national model. In history, economic policies have been framed around various forms of regional specialisation, from Mao's programme of heavy industry-led development and the Third Front Project[1], through Deng's strategy of experimental liberlisation, focused on the coastal areas, to the most recent rounds of Western industralisation (Wei, 2010; Zhang, 2014); these macro-spatial programmes have a profound and cumulative impact on the uneven geographical development in China.

In this respect, Zhang and Peck identify five distinctive regional sub-models within China, giving each a geographical signifier: Guangdong, Sunan, Wenzhou, Zhongguancun and Chongqing. Guangdong, labelled as "dormitory regime in transition", has been the most attractive destination of inter-provincial migration and is characterised by external networks and hierarchical relations, with its export-oriented production regime developed on the basis of low-skill, labour-intensive activities in the Pearl River Delta region (Fan, 2008; Zhang and Peck, 2016). Sunan, labelled as "transnational technology complex", has developed from traditional small-scale handicraft production in the countryside to the "local state corporatism", in which collectively managed township and village enterprises (TVEs) received guaranteed loans from local governments and other types of preferential treatment, and more recently through privatisation of TVEs, this region in the Yangtze River Delta has integrated into global production networks, with massive inflow of foreign investors in

[1] The "Third Front" refers to a large-scale programme, launched on 2014, to develop a series of large-scale industrial sites in China's remote yet strategically secure hinterland, largely in response to Cold War insecurities (Naughton, 1988).

sectors like information technology and advanced machinery, as well as concerted efforts to attract and cultivate human resources and to develop indigenous R&D capacities(Oi, 1999; Shen and Ma, 2005; Zhang, 2008; Zhang and Peck, 2016). In contrast to Sunan, the model of Wenzhou, labelled as "Marshallian development in Crisis" and rose from the local government's having no resources and capacity to develop collectively owned enterprises, is classically characterised by a relatively flat class structure, due to the predominance of small businesses and self-employed people. Combining petty commodity production and large markets, including domestic and international markets, clusters in Wenzhou resemble Marshallian industrial districts in some respects (Wei et al., 2007). Strong kinship and community ties enable a network of "underground" financial institutions, such as large-scale rotating credit associations, unregulated moneylenders and private banks disguised as other entities (Tsai, 2002). The strong network ties are further assisted by voluntary an autonomous grassroots business associations, which play active roles in both the economic and political arena, unlike Sunan, where the heavy presence of government and public enterprises reduced the scope and need for such bottom-up mobilisation (Zhang, 2008; Zhang and Peck, 2016). Zhongguancun, labelled as "Silicon Valley East", is located in the northern suburbs of Beijing, which has unparalleled advantages in human resources and *guanxi* networks, as well as being the most technologically advanced region in China, with substantially higher rates of labour productivity, R&D investment and new product development than other regions (Zhou et al., 2011). The region is characterised by high-technology companies in IT industries and a focus on high-end value-adding services, like design, R&D, marketing and coordination, with labour supply dominated by graduates from local universities and elite overseas returnees, in contrast to the reliance on rural migrant workers typical of many other high-growth regions (The Economist, 2012; Zhang and Peck, 2016). Despite the strategic alliances, subcontracting relationships and other forms of cooperations, inter-firm cooperation is generally weak among those Chinese firms, as they tend to be sceptical of collaboration, favouring in-house development of technology or multinational licensing arrangements, reflecting how levels of trust and weak institutional accountability (Zhou, 2008; Zhou et al., 2011). Remote and isolated as an inland region, Chongqing experienced a "state-dominated model" of development during the Mao era and built manufacturing capacity around the defence industry as the country's wartime capital between 1938 and 1945 (Naughton, 1988; Tsai, 2007). Its economy stagnated after the 1978 reform, and the region became a major source of migrant labour-power destined for coastal regions like Guangdong, from the early 1980s. Since 1997, it has become a municipality directly controlled by the central government due to policy's efforts to develop the west (Hong, 2004). Chongqing has been developed through a model of "land financing", with an especially heavy reliance on SOEs and property developers in the initiation of public infrastructure projects, as well as a renovated form of socialist-developmentalism, married to the globalising market economy (Huang, 2011; Zhang and Peck, 2016).

Despite the uneven geographical development, Wang (2014) argues that China's transition so far has been successful, to the extent that the government's high level of autonomy and state capability interacts with enterprises and agents through interlinked relational contracts, thus making up for missing markets (Wang, 2014: 5). Interlinked arrangements are a kind of transitional governance when markets are either missing or imperfect at the early stage. The various forms of interlinked institutions, especially the township and village enterprises (TVEs), the reforms of the financial sector and of SOEs, contribute to the Chinese miracle. When markets are more complete, there should be alternative governance structures, moving from relation-based to rule-based ones, which are essential for further economic development according to Wang (2014).

In terms of the business systems in today's China, three major forms of enterprises are identified (see Figure 2.2): state-owned sector, local corporates and private sector (Redding and Witt, 2007; Sheldon et al., 2011). The state-owned sector, which used to be dominant under Mao, features with "large, bureaucratic and capital-intensive SOEs, commonly protected from controlling outside ownership". The local corporates, evolved from collective enterprises, tend to "blend private initiative and investment with local government involvement and concomitant use of state resources, including access to plants, land, labour and financial capital". The private sector, which became legal in the 1980s, "consists mostly of family-owned small and medium-sized enterprises and exhibits high level of entrepreneurship" (Sheldon et al., 2011: 37). It now constitutes two-thirds of the Chinese economy.

Figure 2.2 The changing forms of Chinese enterprises: enterprises in the old and new economies

Old Economy		New Economy
State-owned enterprise	→	State-owned enterprise
Collective enterprise	→	Local corporate
		Private enterprise (new form of enterprise)

By following Whitley (1999) and Redding's (2005) method of analysis, the business systems in China are understood in terms of three dimensions: "cultural underpinning" (rationale, identity, authority), "institutional context" (financial capital, human capital, social capital), and "organisational patterns of coordination" (ownership, networks, management) (Sheldon et al., 2011: 35). With regard to the culture, there are two main motivations for a company's existence: to make money and to promote economic development. Private enterprises normally focus on the generation of wealth, especially family businesses, while state-owned enterprises put more emphasis on national economic growth. Due to China's collectivist society, the level of identification with the workplace is low in the private sector, and affiliation to a work unit might still represent one of the concentric circle among SOEs. Old Chinese traditions such as Confucianism have a deep influence on the strongly hierarchical society of China; and this hierarchy is even more apparent in the state-owned sector led by the Communist Party. In terms of the institutional context, the access to financial capital varies distinctively among different business systems. The state-owned sector enjoys privileged access to both banks and stock markets, as well as a low cost of capital. Local corporates, similarly, have good access to finance by having a close connection with local governments. The private sector, however, has very limited access to the stock market and finance, resulting in firms' dependence on equity and informal loans from family, friends and unlicensed lenders. The availability of skills remains a problem, with weak public training; on-the-job training is affected by the short employment tenures in the private sector, and the quality of workers in the state-owned sector is not ensured, though it provides longer tenures. Labour is organised through unions at company level, led by ACFTU, a branch of the Communist Party. Social capital, or trust, tends to be interpersonal; it is strongest at the centre of the concentric circles of affiliation, and is weak outside the circle. Institutional trust, such as trusting strangers through the legal system, is lacking. In terms of coordination, ownership in the private sector is controlled by individuals and their families, while in the state-owned sector, the state has ultimate control. Local corporates, in most cases, are co-owned by private and local government. The horizontal networks across enterprises are relatively weak in China; such connections tend to be rare unless the government encourages them. Coordination in the private sector does occur, and is generally based on personal connections. Management in China is characterised by top-down decision-making; delegation is not common, due to a lack of institutionalised trust. Hence, the role of middle managers tends to involve carrying out and enforcing orders, rather than steering the company (Sheldon et al., 2011).

In terms of employment in the labour market, there has been a distinction between urban and rural workers in China due to their *hukou*[2] status. As mentioned by Gallagher (2017), during the first three decades of China's reform, urban citizens received social benefits and welfare from their places of work, based on their possession of urban, local *hukou*, whilst rural migrants workers were usually excluded from these social benefits, even if they were long-term residents in an urban area and employed by an urban firm (Chan, 2010; Solinger, 1999; Wang, 2005; Zhang, 2001). Instead, they were granted user rights over collectively-owned rural land in their hometowns. However, such division has been criticised because it can lead to problems including severely restrained labour mobility, exacerbated inequality, and encouraged social discrimination and mistreatment of rural citizens in cities (World Bank, 2014). Although in 2014 a plan for a National New Type of Urbanisation 2014-2020 was issued, which aims to increase the permanent urban population (from 54 percent of the total population to 60 percent) and the number of permanent urban residents with urban *hukou* (from 35 percent of the total population to 45 percent), meaning full access to urban social welfare benefits (Yang, 2014), only migrants with formal employment can have the most consequential urban social welfare, such as pensions, medical insurance, unemployment insurance, and

[2] *Hukou* refers to a residential registration system in China, in which every citizen is tied to a specific place (a city for urban citizens, a country for rural citizens) and to a type of production (agricultural for rural vs. non-agricultural for most urban citizens).

occupational injury and disease insurance. As temporary workers with informal employment has been another common phenomenon in China's workforce, there is a limitation of the workplace benefits they can receive if without formal employment. Also, there is a risk for migrants leaving the countryside for urban employment, because there is a possibility of losing their land security totally. Despite some improvements, the urbanisation scheme, which exchanges rural security through land for urban security through employment (Gallagher, 2017), remains problematic as barriers to fair employment still exists and the labour market has been segmented to prevent higher mobility due to *hukou* restrictions.

Moving down to management at enterprise level, Lee (2011) points that the model of Chinese management features "family-orientation" or "intimate relationship with rules and routines"; this differs from Western management models, which are "system-oriented" or "computer-technology-like relationships with performance measures". The distinctive characteristics of the Chinese model result in a hierarchical organisational structure where top leaders steer the company direction and lead managers, and managers lead workers. Consequently, decisions are made by top executives. Lee (2011) points out that though employees are highly efficient in production, they do not have "the know-how, ability and skill to manage sophisticated tasks and solve problems with creative solutions" when faced with a crisis.

From the perspective of leadership and management development, a study by Chen and Kao (2009: 2534) shows that paternalistic leadership is "a widespread people management phenomenon in Chinese organisations". It combines "strong discipline, paternalistic authority and benevolent concern about the welfare and well-being of the employees and their families" (Chen and Kao, 2009; Cooke, 2012: 182). Interestingly, the cultural value and managerial behaviour are found to be changing among the new generation of Chinese managers. Younger managers in China are more independent, individualistic and willing to take risks in pursuit of profit; in contrast to elder managers, who are more collective-oriented and Confucianist in their view and management style (Ralston et al., 1999, Cooke, 2012).

In terms of HR practice, Cooke (2012) gives a systematic analysis of human resource management in current Chinese companies, concerning key aspects such as recruitment and retention, training, pay and rewards, equal opportunities and diversity management, worker's representation and voice and so on. Findings from empirical research by Cooke (2009) show that Chinese employers in private enterprises often adopt strategies including financial rewards, promotion, a happy work environment and talent management programmes, to attract and retain talents, rather than focusing on training and development, for fear of staff turnover. Due to the dilemma of whether to invest in training, some companies adopt a less expensive strategy: the employee-led training programme. In such programmes, employees self-study a certain topic like the latest news or regulations, and then provide a training session to colleagues. This approach is thought to not only improve employees' presentation skills and logical thinking, but also to create a learning and collegial environment in the workplace. According to the survey on 1,875 firms across the country by Chen et al. (2009), the training provisions in Chinese companies narrowly focus on technical aspects instead of soft skills. Another national survey (Li, 2005) revealed that the incidence and implementation of formal training plans decreases gradually from the state-owned sector to foreign-invested/ joint ventures, and then to the private enterprises which focus more on capital and markets. The larger the company, the more likely it is to adopt training plans. Employees with high education, working in large and knowledge-intensive companies, tend to receive more comprehensive training and development (Cooke, 2012). In addition, though not being dominant, the system of mentoring, which supports employees' professional development and personal growth as well as matching their needs with that of the firm, has become increasingly popular among MNCs (multinational corporations) and leading Chinese enterprises (Cooke, 2010).

From the perspective of performance management, there is a growing trend in both the state-owned and private sectors to adopt a Western-style performance appraisal, which is linked to the setting of pay rates, in order to promote productivity and management efficiency. This continuous change is likely to convert Chinese firms from traditional performance appraisal system (focusing on the person and their behavioural performance) to the modern one (focusing on the alignment between individual performance and organisational goals) (Cooke, 2012). Fundamental changes have also occurred in the pay system. Wei and Rowley (2009) argue that the traditional pay system in China has been transformed from "a state-administrated reward system featured with low wage policy and flat wage structure" into "an enterprise-administrated and contract/performance-based system with diversified wage structures (e.g. wage, bonuses, subsidies and benefits) and flexible pay schemes (e.g. profit-related bonus, stock options, company-based welfare benefits) in different ownership forms" (Cooke, 2012: 87).

The concept of managing diversity largely remains unfamiliar to Chinese managers, and "inequality at the workplace and in society is often accepted and internalised without any serious challenge" (Cooke, 2012: 131). To a large degree, Chinese managers adopt the paternalistic approach in dealing with diversity, usually in the method of handling individual employees' needs and requests (Cooke, 2012). In terms of the worker's representation and voice, ACFTU, the only union officially recognised by the Chinese government, is constrained mainly by the "absence of legality of collective actions in the collective negotiation, collective consultation and collective agreement process" in presenting workers (Feng, 2006; Cooke, 2012: 154). It is also argued that the government and trade unions' efforts to set up collective bargaining from the top-down can only meet with resistance or at best half-hearted acceptance but ultimately limited implementation, and both employers and workers are likely to be skeptical (Wen and Lin, 2015). There are some alternative forms of organising and representation, such as the All-China Women's Federation (ACWF), labour authorities of local governments, job centres and employment agencies, and training centres and legal centres. However, the ineffectiveness of ACFTU and other organisations in defending workers' rights has led to "workers' self-organising". For instance, a "tongxiang hui" (loosely formed association of workers from the same region) is often set up in some workplaces and local areas where large numbers of migrant workers live and work, in order "to voice workers' grievances, to resolve their disputes with employers, to share labour market information, and to provide peer support and a forum for social bonding" (Gao and Jia, 2005; Cooke, 2008; Cooke, 2012: 150-151).

Recent research by Smith and Chan (2013) explores another new model that has become popular in China: the internship model. The model is characterised by employers recruiting student interns for regular employment. At the same time, some teachers follow their "student-workers" into the factory and become a "teacher-supervisor", "co-managing the utilisation of their labour services and receiving a second salary for their work" (Smith and Chan, 2013: 2). This model is beneficial to employers because student-interns are flexible, cheaper, and attractive due to the mass scale of their recruitment. However, student-workers do not choose a placement for their internships from vocational schools; the decision is made between schools, corporations and local states. Therefore, their internship is increasingly disconnected with their individual needs. Moreover, “internships are not related to their area of study, invalidating the basic principle of vocational education, which is to combine theory and practice within an occupationally-focused education programme” (Smith and Chan, 2013: 2). According to Smith and Chan, the model is not sustainable: in the long run, “the misalignment between the needs of the student and poor training offered, will reduce the attractiveness of VET (vocational education and training)” (Smith and Chan, 2013: 22). Therefore, further improvement of Chinese management and work organisation should be made.

In summary, with continuous economic reforms, the model of China has moved from a planned economy to a socialist market economy where governmental involvement is also important. Despite Chinese culture’s profound influence on organisation and management, which features collectivism, hierarchy and personal connections, a more system-based approach is now being accepted by Chinese companies. Due to the differences between the old and new models, innovation and job quality are changing as well. Innovation was characterised by state-led and top-down innovation in the old model of the planned economy, where state-owned enterprises follow directions from the government and decision-making power is concentrated in organisations. With the introduction of the market mechanism and reduction of government involvement, innovation in the new model is becoming more autonomous, as companies have their own initiatives for innovation when faced with competitions and challenges in the market. Job quality is changing as well, moving from the old type of very stable and secure jobs to the new situation of higher job fluidity, increased autonomy and inequality in jobs. Also, there is a distinction between urban and rural workers in terms of workplace treatment, though policies of new urbanisation issued in recent years have been trying to reduce the gap to certain degree.

The next section focuses on the municipality of Shanghai in China. Some comparisons are made between China and Shanghai through a discussion ranging from labour law to the local economy, both of which are believed to provide an important context for the changing of the Chinese workplace and employment.

2.3 Shanghai within China

The People's Republic of China consists of four municipalities (Beijing, Shanghai, Tianjin, Chongqing), 23 provinces (Jilin, Hebei, Shandong, Jiangsu, Zhejiang, Fujian, Guangdong, Xian, Sichuan, Yunnan, etc.), five autonomous regions (Inner Mongolia, Ningxia Hui, Xinjiang Uygur, Tibet, Guangxi Zhuang), and two special administrative regions (Hong Kong, Macau). As one of the municipalities controlled directly by the central government, Shanghai is regarded as the largest economic centre, trading port and comprehensive industrial city in China. Due to its superior geographic location in the Yangtze River delta, Shanghai is also an important centre for science and technology, trade, finance and information.

2.3.1 Labour laws in China and Shanghai

The major labour-related laws in China have been issued since 1992, when the promulgation of the Trade Union Law of the People's Republic of China expanded trade union's mandate to cover the non-state sector and to sign collective agreements on behalf of workers. The Labour Law of the People's Republic of China, which was adopted on 5 July 1994 and came into effect on 1 January 1995, creates flexibility for employment in the market environment through the use of contracts (Editorial Group, 2010; Sheldon, 2011). It legislates in key areas such as employment promotion, labour contracts and collective contracts, wages and holidays, job security and protection, training and welfare, and disputes. Notably, aspects related to the treatment of employees, including wages and holidays, job security and protection, and training and welfare, are key indicators of job quality. Moreover, training, which for instance provides opportunities for developing of employees' skills and capabilities, can potentially promote advancement in science and technology, and the creation of new ideas, thereby enhancing innovation. Therefore, labour laws are closely linked with job quality and innovation.

In the Labour Law, some basic requirements are given regarding working hours, holidays, wages, labour health and safety, special protection for female and juvenile workers, vocational training, social insurance and welfare, labour disputes, supervision and inspection, and legal responsibilities. For instance, it is required that the daily working hours of employees should not exceed eight hours, and the average working hours per week should not be more than 44 hours. Employers should ensure that employees have at least one day off each week, and female employees can enjoy no less than 90 days of maternity leave.

In 2001, with China joining the WTO (World Trade Organization), an amendment to the Trade Union Law was passed to extend the legal rights and mandate of trade unions in terms of the foreign-invested joint venture sector. The most recent advances in labour legislation, however, are the Labour Contract Law (LCL) and its companion laws: the Employment

Promotion Law, and the Law of the People's Republic of China on Labour Dispute Mediation and Arbitration. Adopted in 2007 and coming into effect in 2008, the LCL's main contribution is improving employees' contractual security and protecting migrant workers' rights against employers. As Ho (2009: 30) summarises, "while the 1994 Labour Law was designed to facilitate greater flexibility and mobility within the workforce, many new measures in the Labour Contract Law, such as limits on terminations, protection for temporary and seconded workers, and rules on open-ended labour contracts, are intended to increase workers' job security". The Employment Promotion Law, on the other hand, confirms the role of the government in maintaining employment and employment services; while the Law on Labour Dispute Mediation and Arbitration establishes and expands the rights of workers to call upon mediation, and arbitration tribunals and courts (Sheldon, 2011).

Compared with Chinese laws at national level, Shanghai, as a municipality, has its own local laws; these are issued by the Shanghai Municipal Human Resources and Social Security Bureau, in terms of practical implementation. While still following the national laws, Shanghai has detailed rules and regulations, such as the Shanghai collective contract regulation, Shanghai vocational education regulation, rules of Shanghai labour unions, rules of Shanghai labour contracts, Shanghai talent-flow regulation, a plan for Shanghai's implementation of the State Council's decision on the establishment of a basic medical insurance system for urban workers, and so on.

The Labour Law of Shanghai, which came into effect on 1 May 2002, mainly focuses on the labour contract, including its establishment, fulfilment, changes to the contract, dissolution and termination, special regulations for the part-time labour contract, and legal liability. According to the Law, a labour contract must include the following information: duration of employment, contents of job, labour protection and conditions, remuneration, labour discipline, conditions for contract termination and liabilities for contract violation, these being consistent with those in Chinese labour law. Although it follows the general guidelines from the national labour-related laws, Shanghai has some different standards of regulations, in terms of implementation. Specifically, its requirements are relatively high, when compared with the whole country. For example, the new minimum wage for 2015 is 2,020 yuan (US$ 337 equivalent) per month and 18 yuan (US$ 3 equivalent) per hour in Shanghai; in this regard, it is ranked in second place after the city of Shenzhen, and is apparently higher than the average rate in China (Askci.com, 2015). In addition, there are systematic laws and regulations for local labour in very detailed aspects, including employment administration, vocational training, social insurance, personnel and talent, labour relations, labour rewards, welfare benefits, labour protection, labour disputes, civil servants, social affairs, funds collection, normative documents of natural failure and revocation, and others. For instance, the vocational training involves technical-school management, job training, professional qualification certificates, and verification of professional skills. The welfare benefits are divided into different types, such as pensions for ill health, living costs, childcare, transportation, working age, support for direct relatives, exit for private purposes, and so on (Shanghai Municipal Human Resource and Social Security Bureau, 2015). To sum up, the labour laws in Shanghai both follow the rules stated in national labour laws and have specific details that better suit the distinctive characteristics of the local economy and labour.

However, the implementation of labour laws remains problematic, according to many scholars. Sheldon et al. (2011) argue that both high-level central government agencies, such as the Ministry of Human Resources and

Social Security (MOHRSS), and the national trade union, i.e. the ACFTU, do not play a great role in actual implementation, due to their limited power to enforce policies. "For those large numbers of workers and employers involved, the difficulty in implementing labour laws revolves around the role of local governments", as "local labour bureaus, labour arbitration commissions, and courts are frequently under the influence of local governments, whose interest may align more closely with those of local employers than with workers" (US-China Business Council, 2007: 43; Sheldon et al., 2011: 57). Krug and Hendrischke (2008) state that the reason why local bureaucracies are slow or reluctant to implement the required measures lies in the well-known "dual leadership" structure of local governance, which "subordinates local agencies of central bureaucracies, such as local Labour Offices, to the local government and party leadership" (Sheldon et al., 2011: 58).

Similarly, Gallagher (2017) points that the enforcement of and compliance with these new standards by local governments and employers is far from guaranteed. Through examination, a distinction is found: while workers with high levels of education are far more likely to claim the new rights from labour laws and be satisfied with the results, many others left disappointed with the large gap between law on the books and law in reality, reject the courtroom for the streets. Also, new workplace rights fuel workers' rising expectations, but a dysfunctional legal system drives many workers to more extreme options, including strikes, demonstrations and violence. According to Gallagher (2017), China has a large gap between what is formally promised in law and what is actually delivered on the ground. Although this is true, this thesis argues that the situation commonly exists in other countries. For instance, the equal opportunities (EO) policies in the UK were reported to be "empty shells" rather than substantive, because they were found to be limited in practice and inequality persisted within the organisation, due to a lack of supporting practices at workplace and restricted access by employees (Hoque and Noon, 2004). It should be noted that China is currently in transformation, through continuous improvement of its institutions and practical enforcement towards a more regulated and formal system.

Despite the problems, some positive consequences of implementation also exist. Cases such as Huawei and Carrefour show that formal legal mechanisms can be used to enforce stipulations of the new LCL (Sheldon et al., 2011). Furthermore, the LCL and Labour Dispute Mediation and Arbitration Law are having an impact on the existing positions of the institutional actors, thus triggering the emergence of new actors (e.g. foreign client firms, international non-governmental organisations and HR consultancy firms), as well as increasing the power of existing actors (e.g. employer's associations/pressure groups, employment agencies) (Cooke, 2012).

2.3.2 Shanghai's economy in recent years

According to the annual report on Shanghai's domestic economy and social development, the resident population of Shanghai had reached 24.26 million by the end of 2014, including 14.29 million permanent residents and 9.96 million non-permanent residents. In 2013, the population was 24.15 million, including 11.37 million employees. The registered unemployment rate in urban areas was 4.2%; this figure stayed unchanged in 2014, but the number of new added jobs decreased from 600.5 thousand (in 2013) to 599.6 thousand (in 2014) (Shanghai Statistics Bureau, 2015; Shanghai Statistics Bureau, 2014). From the perspective of labour demand and supply, the rising numbers of employees in recent years (11.04

million in 2011, 11.15 million in 2012, 11.37 million in 2013) indicates a growth in labour demand, while the increasing quantity of retired and resigned people (3.64 million in 2011, 3.78 million in 2012, 3.91 million in 2013), as well as the steady amount of graduates (178 thousand in 2013 and 2014), shows an overall downward trend in labour supply (Shanghai Statistics Bureau, 2014; Chinese Education Online, 2013, Chinese Social Science Network, 2014).

In 2014, Shanghai achieved its GDP (gross domestic product) of 2356.09 billion yuan (US$ 392.68 billion equivalent), an increase of 7.0% compared with 2013. The GDP in each industry continued to grow in 2014, with the rate of 0.1% in primary industry, 4.3% in secondary industry and 8.8% in tertiary industry. Notably, the increased GDP in tertiary industry constitutes 64.8% of Shanghai's total GDP (Shanghai Statistics Bureau, 2015). Compared with the composition of GDP in China as a whole, which has some similar characteristics (such as primary industry having the lowest GDP, and tertiary industry the highest with continuous growth), the proportion of GDP in Shanghai's different industries is more significantly unbalanced, with primary industry contributing only 0.5% in 2014, and tertiary industry more than 120 times this amount (see Table 2.1).

Table 2.1 Economy of China and Shanghai in 2013, 2014

	China		**Shanghai**	
	2013	**2014**	**2013**	**2014**
Population (million)	1,360.72	1,367.82	24.15	24.26
Total GDP (billion USD equivalent)	9,480.75	10,607.72	360.03	392.68
Primary industry (%)	949.28 (10)	972.20 (9.2)	2.15 (0.6)	2.07 (0.5)
Secondary industry (%)	4,161.4 (43.9)	4,523.2 (42.6)	133.80 (37.2)	136.08 (34.7)
Tertiary industry (%)	4,370.07 (46.1)	5,112.32 (48.2)	224.08 (62.2)	254.53 (64.8)
Employment (million)	769.77	772.53	11.37	13.66
Primary industry (%)	241.71 (31.4)	227.90 (29.5)	0.46 (4.1)	0.45 (3.3)

Secondary industry (%)	231.70 (30.1)	230.99 (29.9)	4.46 (39.2)	4.77 (34.9)
Tertiary industry (%)	296.36 (38.5)	313.63 (40.6)	6.45 (56.7)	8.44 (61.8)
Graduates (million)	6.99	7.27	0.18	0.18
Minimum wage (USD equivalent/month)	*	*	270.00	303.33
Average wage (USD equivalent/year)	8,580.50	9,389.83	10,367.17	10,902.83

* Minimum wages are set differently by province and municipality.

Sources: *China Statistical Yearbook 2014; Annual Report of Domestic Economy and Social Development in 2014; Shanghai Statistical Yearbook 2014; Annual Report of Shanghai's Domestic Economy and Social Development in 2014.*

Among companies in Shanghai, there are variations in ownership, management and employment that can potentially affect innovation and job quality within the municipality. In terms of the industry in which people are employed, the tertiary industry has enjoyed the biggest share of employees in the past years (56.3% in 2011, 56.5% in 2012 and 56.7% in 2013), while the secondary industry and the primary industry have only attracted around 40% and 4% of employees respectively. Again, the tertiary industry has become the biggest contributor in terms of employment. This feature is noticeably more apparent in Shanghai when compared with the figures for the whole country, which display a relatively even distribution of employees in the three main industries (see Table 2.1). More specifically in Shanghai's tertiary industry, retail and wholesale (16.4%), leasing and business services (5.8%), transportation, warehousing and post (5.3%), resident services, repairs and other services (5.1%), and hoteling and catering (4.2%) are the top industries in terms of employee numbers (in 2013). Furthermore, by taking different types of working units into consideration, it is clear that most workers and staff work in private enterprises (88.03%), including domestic private enterprises (65.50%) and non-mainland and foreign enterprises (22.53%) (see Table 2.2). Some typical service industries are retail and wholesale, hoteling and catering, information transmission, software and IT services, and real estate. In contrast, industries such as public administration, social security and social organisations, health and social work, and education are generally dominated by state-owned enterprises, which attracted 10.91% of all employees (Shanghai Statistics Bureau, 2014).

Table 2.2 Employment composition by type of enterprise in China and Shanghai 2013

	State-owned Enterprises	**Collective Enterprises**	**Private Enterprises**	
			Domestic mainland	**Non-mainland (Hong Kong, Macau, Taiwan) and foreign**
China (urban employment %)	19.60	1.70	44.30	34.40
Shanghai (employment %)	10.91	1.06	65.50	22.53

Sources: *China Labour Statistical Yearbook 2014*; *Shanghai Statistical Yearbook 2014*.

The total average wage of employees in Shanghai has increased continuously, reaching 62,203 yuan (US$ 10,367 equivalent) by 2013, which is higher than the overall level in China. The average wages in each industry are apparently different: 35,230 yuan (US$ 5,872 equivalent) in primary industry, 52,271 yuan (US$ 8,712 equivalent) in secondary industry, and 71,385 yuan (US$ 11,898 equivalent) in tertiary industry. Therefore, the average wage in tertiary industry was relatively the highest. More specifically, among various service industries, employees working in the financial industry normally received the highest average wage at 178,062 yuan (US$ 29,677 equivalent), followed by 135,050 yuan (US$ 22,508 equivalent) in the information transmission industry, and 104,365 yuan (US$ 17,394 equivalent) in the healthcare industry. The lowest average wages, in contrast, appeared in the industries of resident services, repairs and other services (28,340 yuan, equal to US$ 4,723), catering (32,335 yuan, equal to US$ 5,389), and entertainment (40,224 yuan, equal to US$ 6,704). In general, foreign companies had higher wages than state-owned companies and domestic private enterprises (Shanghai Statistics Bureau, 2014).

2.4 Conclusion

The purpose of this chapter was to analyse the context of innovation and job quality in China, with special emphasis on Shanghai, which is the geographical focus of this research. In order to develop the model of China, this chapter critically analysed different theoretical models that are prevalent and dominant in academic field, and finally adopts a mixed approach to explore the Chinese model.

The approach of varieties of capitalism by Hall and Soskice (2001) is useful, as it identifies two typical models of economies (i.e. the liberal market economies and the coordinated market economies), and leads to considering the distinction between market and non-market mechanisms when assessing an economy. China, in this case, should be somewhere between these two economy types, because market competition is increasing but the government still plays a role in coordination and non-market cooperation. Whitley’s (2007) model of business systems is also useful, as it starts from another angle and provides a more detail classification. Although his model cannot represent China well, his method of analysis is worth referring to. By grouping China within the “Asian” type, together with Japan and Korea, Stanford (2015) describes in important feature as “paternalist corporatism”, but lacks a much deeper analysis that can distinguish China from Japan and Korea. Although none of the theoretical models discussed fits China well, they provide useful tools for understanding China, because different aspects can be considered when analysing the country. The mixed approach adopted to explain the Chinese model of economic organisation takes consideration of different perspectives, including the Chinese economy, business system, management and employment; these help reflect China's position as a unique context.

Through discussion, it is shown that China's model has undergone changes, moving from the old model of a planned economy to the new model of a socialist market economy, where governmental involvement is also important. Although Chinese culture has a profound impact on organisation and management, which is characterised by collectivism, hierarchy and personal connections, Chinese companies are adopting a more system-based approach. Great changes have been made in terms of governance, management and employment. While still having ownership, the state, which used to be the owner, operator and employer of state-owned enterprises, has decentralised decision-making and management to SOEs. At the same time, the old model's "three irons", comprising the "iron rice bowl" (lifetime employment), "iron wage" (centrally administered wages) and "iron chair" (ministry-based appointment and promotion of managerial staff), are replaced by the introduction of interlinked relational contracts. Moreover, there is a transition from personnel management towards human resource management. Comparing the new model with the old, innovation in China has transformed from state-led and top-down innovation to a more autonomous one, with science and technology as a pillar of modernisation. The aspects of work and employment confirm that job quality has changed dramatically through the transition. Job quality, which used to be characterised by very stable and secure jobs, has now moved to the new situation of higher job fluidity, increased autonomy and inequality in jobs. Therefore, the changing context regarding the Chinese model of economy and business has had impact on innovation and job quality.

The analysis of Shanghai’s economy shows that there are variations in ownership, management and employment within Shanghai. The tertiary industry, or the service industry, plays the most important role due to its dominance in economic contribution and employment, while primary industry constitutes the smallest part of Shanghai’s local economy, similarly to the overall economic structure of China. Most people are employed in private enterprises, with more than three-fifths in mainland private enterprises and one-fifth in Hong Kong, Macau, Taiwan, and foreign enterprises. Again, the characteristics of employment by type of enterprise in Shanghai are similar to those in China. Private enterprises enjoy big shares in industries such as retail and wholesale, hoteling and catering, information transmission, software and IT services, and real estate. Unlike in the past, the state-owned enterprises in Shanghai nowadays only contain around one-tenth of the total working population, but they dominate certain industries such as public administration, social security and social organisations, health and social work, and education.

Chapter 3. Innovation Policy, Theory and Model

This chapter discusses innovation in depth, from different perspectives. Firstly, by referring to various innovation policies adopted so far by different countries and international organisations, an analysis is made on what are the main focuses of current innovation policies, especially the Chinese one. Secondly, as the prevalence of innovation policy indicates the growing importance of innovation, key questions concerning theory of innovation are thus raised. For example, what is the definition of innovation? How are different types of innovation distinct from each other? and Why is innovation essential for long-term growth? Consequently, the second section examines innovation theory and attempts to explore various streams of innovation theory. Based on theory of innovation, as well as the policy and system of innovation in China, the last section discusses the model of innovation used in this research. Also, through evaluation of different approaches to measuring innovation, a decision is made regarding what innovation indicators will be chosen. The scope of innovation, together with the measuring indicators adopted, will constitute an innovation model for this research.

3.1 Innovation policy

Innovation has been widely emphasised by many countries and organisations, and has attracted special attention in their policy-making. It is generally regarded that innovation plays a critical role in the continuous development of the economy and society. Key organisations in the world, such as the OECD (Organisation for Economic Co-operation and Development), EU (European Union), UN (United Nations) and World Bank have issued policies aiming to strengthen innovation in different contexts, providing a benchmark for innovation policies in different countries. China, as the world's second-largest economy but still a developing country, also stresses innovation in its government policy, which is country-specific. Therefore, the following part begins with a discussion of the most recent innovation policies from two major organisations, the OECD and EU. By presenting what they are focusing on and how they are respectively intending to achieve their goals, comparisons are made to reflect their policy features. This helps to understand the current innovation policies in major and advanced economies. Then, attention is moved to Chinese innovation policy; this involves an overall summary, as well as an in-depth analysis concerning specific national policy and regional innovation policy.

3.1.1 Innovation policy in key organisations

3.1.1.1 OECD innovation strategy

The Organisation for Economic Co-operation and Development (OECD) is an international organisation dedicated to economic development with its headquarters in Paris, France. First established in 1961, the OECD originally consisted of 18 European countries plus the United States and Canada, and at present it has 34 member countries globally. Working closely with governments, business and labour, the OECD aims to "promote policies that will improve the economic and social well-being of people around the world" (OECD, 2016).

According to the OECD (2015a: 2), "governments play a key role in fostering a sound environment for innovation, in investing in the foundations for innovation, in helping overcome certain barriers to innovation, and in ensuring that innovation contributes to key goals of public policy". The *OECD Innovation Strategy 2015* is an agenda for policy action on innovation, which helps strengthen the performance of innovation and promote stronger, greener and more inclusive growth. In consideration of the current context of slow growth and pressing social challenges, five priorities are emphasised for policy makers, which serve as the basis for a comprehensive and action-oriented approach to innovation. They are (OECD, 2015a):

1. To strengthen investment in innovation and foster business dynamism;
2. To invest in and shape an efficient system of knowledge creation and diffusion;
3. To seize the benefits of the digital economy;
4. To foster talent and skills, and optimise their use;
5. To improve the governance and implementation of polices for innovation.

First, in relation to investment in innovation and business dynamism, much business investment today is no longer in physical equipment or buildings, but in knowledge-based capital (KBC), which is found to be more resilient than fixed capital. In order to make investment in KBC more effective, the OECD encourages structural reforms in product, labour, and financial markets by enabling capital and labour resources to flow to the most productive, often KBC-intensive companies, thus enabling them to achieve a sufficient scale. This requires easy reallocation of resources to their most productive uses. Therefore, “well-functioning product, labour, risk capital markets, and policies that do not trap resources in inefficient firms (e.g. bankruptcy laws that do not excessively penalise failure)” are central (OECD, 2015a: 7). At the same time, an open market, and competition as well as participation in global value chains (GVCs) are encouraged because they are beneficial to innovation diffusion. Moreover, access to finance, especially external financing, is important when innovative companies, particularly young firms, begin to grow. Mechanisms including seed and early-stage equity finance (e.g. venture capital and angel investment), public listings for SMEs, efforts to boost the supply side of the equity market, and demand-side initiatives (e.g. improving investment readiness and improving finance-related skills in new and small firms) are highly recommended (OECD, 2015a).

Second, in terms of investing in and shaping an efficient system of knowledge creation and diffusion, government plays an important role in providing some of the foundations for innovation. A long-run and stable public funding is needed to support various researches, including basic research (driving long-term productivity growth), curiosity-driven research (the source of many significant innovations with high social returns) and project-based research (more direct steering towards major public policy objectives). In order to foster knowledge creation and diffusion, it is critical to enable knowledge flows and the development of networks and markets which help the efficient creation, circulation and diffusion of knowledge; for example, the adoption of a sound and effective system of IPR (intellectual property rights) and global cooperation on research. According to the OECD (2015c), policies for the commercialisation of public research should not only address patents and licensing, but also involve public-private collaborative research, student and faculty mobility, contract research, faculty consulting and student entrepreneurship. Policy makers should also be aware that both direct (e.g. contracts, grants, awards for mission-oriented R&D, support for networks) and indirect measures (e.g. R&D tax incentive measures) should be balanced to support business R&D, with attention paid to effectiveness, and a focus on high social returns and international good practices. The allocation of direct support should be non-automatic and based on competitive, objective and transparent criteria, and tax relief measures should be systematically evaluated to assess whether their targeting and design remains appropriate. Furthermore, non-financial supports such as training, mentoring and network development are also important to the overall policy mix (OECD, 2015a).

Third, considering the benefits of the digital economy, the Internet is essential for innovation in the 21st century, as it has become a platform for innovation where creativity, idea exchanges, entrepreneurship and experimentation can flourish. As companies increasingly extend production internationally, an open Internet is beneficial to the management of global value chains (GVCs). According to the OECD, “the growing number of computer mediated transactions and the accelerating migration of social and economic activities to the Internet are contributing to the generation of a huge volume of (digital) data”: this is known as “big data”, which has become an important resource for organisations to generate innovations in product, processes, organisational methods and markets in highly creative ways (OECD, 2015a: 12). However, in view of the challenges that big data also presents (e.g. individuals’ concerns over by privacy violations, the appropriation of returns on investment in data-driven innovation, assessing market concentration and barriers to competition, and promoting a culture of digital risk management across society), governments need to strike a reasonable balance between “the social benefits of openness and private preferences for a less open system” (OECD, 2015a: 13).

Fourth, by emphasising the significance of education and training systems in fostering talent and skills, as well as in optimising their use, the OECD states that the key principle lies in the “creation of an environment that enables individuals to choose and acquire appropriate skills and support the optimal use of these skills at work” (OECD, 2015a: 13). In initial education, broad curricula, updated pedagogical practices and the development of tools to assess skills related to innovation need to be guaranteed; while beyond subject-specific expertise, creativity, critical thinking, entrepreneurship and communication skills should also not be neglected. In terms of promoting firm-level training in the workplace, the OECD suggests providing policies that can improve information about training opportunities, setting legal frameworks so that private parties can organise and finance their training (e.g. through contracts), and increasing the portability of skills through various learning channels; together these are supplemented by the public funding of vocational education and training, as well as tax incentives. In addition, governments should avoid gender discrimination at work, which can often be seen in gender stereotypes, or non-transparent nomination and appointment procedures. Such policies will help make the most of the available talent pool. Furthermore, the development of enduring linkages and networks among researchers and innovators across countries should be encouraged through various methods, especially by offering efficient, transparent and simple migration regimes for the highly skilled, removing restrictive recruitment practices, and reforming overly restrictive immigration and visa policies (OECD, 2015a).

Last, the success of innovation policy is dependent on its governance and implementation, which need to be improved. Government needs to ensure the early and adequate involvement of stakeholders, including business, academia, social partners, and key actors in the process of developing national strategies. The full set of innovation policies should be well aligned, both at the level of central government and between central government and regional and local authorities. Furthermore, it is important to monitor and evaluate policies, learn from experience, and adjust policies over time. According to the OECD, the increasing importance of governance is giving rise to a new approach to innovation policies in many countries, where governments tend to act as facilitators that focus on building networks, improving coordination and regulation, promoting awareness, and encouraging less reliance on government funding. Nevertheless, in order to be more effective, innovation policies and related governance should be adapted to the specific challenges faced by each country, as well as being aligned with the capabilities of each country (OECD, 2015a).

3.1.1.2 European Union innovation policy

The European Union (EU) is “a unique economic and political partnership between 28 European countries that together cover much of the continent” (EU, 2016). The EU not only involves economic cooperation, but also spans policy areas from development aid to the environment.

The Innovation Union from the EU is one of the seven flagship initiatives of the *European 2020 Strategy* (2010) for “smart, sustainable and inclusive growth”. It is built to “improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs” (European Commission, 2010b: 5). The Innovation Union’s plan identifies 34 action points, which aim to: “make Europe into a world-class science performer; remove obstacles to innovation (e.g. expensive patenting, market fragmentation, slow standard-setting and skills shortages); and revolutionise the way public and private sectors work together, notably through Innovation Partnerships between the European institutions, national and regional authorities and business” (European Commission, 2010a). According to the European Commission (2010c) the action points are grouped into the following general categories:

1. Strengthening the knowledge base and reducing fragmentation;

2. Getting good ideas to market;
3. Maximising social and territorial cohesion;
4. Pooling forces to achieve breakthroughs, through European Innovation Partnerships;
5. Leveraging policies externally;
6. Making it happen.

Compared with the OECD's innovation strategy for policy-making, the European Commission gives more practical initiatives for the development of innovation. While the OECD focuses on key areas as priorities for innovation policy, the EU states its policy in a more systematic way based on the innovation cycle, from the very beginning of innovation activities to their final stage. Despite the difference between the two policy systems, they actually overlap with each other in many aspects (see Table 3.1). For instance, both of them emphasise the importance of knowledge and skills, funding and finance access, cooperation, and also evaluation and improvement of the system. The following paragraphs briefly summarise the key initiatives from the EU's innovation policy.

Table 3.1 Key areas of innovation policies by the OECD and EU

<table>
<tr><th></th><th>OECD</th><th>EU</th></tr>
<tr><td>Similarities</td><td colspan="2">Knowledge and skills development;
Funding and finance access;
Networks and cooperation on research;
Employment conditions;
Participation of various stakeholders;
Assessment and improvement of the innovation system.</td></tr>
<tr><td>Differences</td><td>Utilisation of the Internet and big data;
Free flow of capital and labour resources.</td><td>Social and territorial cohesion;
External leverages.</td></tr>
</table>

Sources: OECD Innovation Strategy 2015; Europe 2020 flagship initiative Innovation Union.

Firstly, to strengthen the knowledge base and reduce fragmentation, the EU emphasises on four aspects: 1) Promoting excellence in education and skills development (e.g. researcher training, attractive employment conditions, an independent multi-dimensional international ranking system for benchmarking university performance, “Knowledge Alliances” between education and business that address innovation skills gaps, e-skills for innovation and competitiveness). 2) Delivering the European Research Area (e.g. European Research Area framework and supporting measures to remove obstacles to mobility and cross-border co-operation, European research infrastructures). 3) Focusing EU funding instruments on Innovation Union priorities (e.g. EU research and innovation programmes, “European Forum on Forward Looking Activities”); and 4) promoting the European Institute of Innovation and Technology (EIT) as a model of innovation governance in Europe (e.g. Strategic Innovation Agenda by the EIT) (European Commission, 2015a).

Secondly, getting good ideas to market involves efforts to enhance access to finance for innovative companies (e.g. innovation and risk-sharing finance for investments in R&D and innovation projects, free functioning and investment of venture capital funds in EU Member States, cross-border matching of innovative firms with suitable investors, mid-term review of the “state aid for research and development and innovation” framework). It is also necessary to create a single innovation market (e.g. EU patents, the screening of the regulatory framework, the standardisation strategy for Europe 2020, public procurement with Commission support and joint public procurement, and an eco-innovation action plan). Further efforts include promoting openness, and to capitalise on Europe’s creative potential (e.g. through the European Design Leadership Board and

European Creative Industries Alliance, open access to research results/ research information services, effective collaborative research and knowledge transfer, a European knowledge market for patents and licensing, and competition policy safeguarding against the use of intellectual property rights for anti-competitive purposes) (European Commission, 2015a).

Thirdly, the maximisation of social and territorial cohesion, according to the European Commission (2010c), requires the spread of the benefits of innovation across the Union, as well as an increase in social benefits. It is stressed that "member states should considerably improve their use of existing Structural Funds for research and innovation projects, helping people to acquire the necessary skills, improving the performance of national systems and implementing smart specialisation strategies and trans-national projects" (European Commission, 2010c: 21). Moreover, the launching of the European Commission's "European Social Innovation" pilot will develop social innovation through the European Social Fund (ESF). Other supports include a Public Sector Innovation Scoreboard and research programme on public sector and social innovation, as well as a consultation of social partners on the interaction between the knowledge economy and the labour market (European Commission, 2015a).

Fourthly, to pool forces to achieve breakthroughs, all key stakeholders, including the Council, Parliament, member states, industry and other stakeholders, are invited to "support the innovation partnership concept and to indicate the specific commitments they will undertake to make the concept work" (European Commission, 2010c: 26). They are encouraged to commit themselves "to pooling efforts and resources to achieve the partnership's intended objectives" (European Commission, 2010c: 26). For instance, the launching of the partnership on active and healthy ageing and the generation of its proposal take into account both the views of Parliament and Council and input from other stakeholders (European Commission, 2015a).

In terms of leveraging policies externally, attention is given to retaining and attracting international talent, scientific cooperation with third countries by removing barriers to market access, and facilitating standardisation, IPR protection, access to procurement, etc. There is also an international partnership on the development of research infrastructures, including ICT infrastructures; which, owing to cost, complexity and/or interoperability requirements, can only be developed on a global scale (European Commission, 2015a).

Finally, the reform of research and innovation systems and measurement of the progress made are central to making innovation happen. EU member states are invited to conduct self-assessments and identify key challenges and critical reforms as part of their national reform programmes, supported by the Commission through exchanges of best practice, peer reviews and development of the evidence base; their progress is monitored by the "European semester", an integrated economic coordination. A research and Innovation Union scoreboard has been used by the Commission to monitor overall progress on innovation performance. Also, a new indicator measuring the share of fast-growing innovative companies in the European economy has been launched (European Commission, 2013; European Commission, 2015a).

In summary, the innovation policies from the OECD and EU provide benchmark adopted by different countries around the world.

3.1.2 Innovation policy in China

3.1.2.1 Summary of Chinese innovation policy

The revolution of China's national innovation system has mainly passed through three stages, from the government-led formative period (1949-1977) to the market-oriented transition period (1978-2005), and then to the indigenous innovation-oriented development period which began in 2006 (Ding and Li, 2015). These stages have resulted from distinctive policy orientations made by different leaders of China when they were in power. With the changing of the institutional and economic structure, Chinese innovation policy has been developed continuously.

The core strategy of the Chinese government at present is "to encourage indigenous innovation and to build an innovation-oriented economy in the new century, with many S&T (science and technology), industrial and macroeconomic policies giving attention to promote technological innovation and competitiveness" (Fu, 2015: 149). The model of open innovation has been adopted by Chinese policy makers who have continued to make the domestic market and institutional environment more open and favourable to innovation flow (Fu, 2015). The most recent policy for indigenous innovation stemmed from two policy documents: the *Decision on Implementing the Outline of the Scientific and Technological Plan and Enhancing the Independent Innovation Capacity* and the *National Guideline for Medium and Long-term Plan for Science and Technology Development (2006-2020)*; these documents regard "integrated innovation" and "innovation on the basis of introduction, digestion and absorption" as two basic forms of indigenous innovation (Fang, 2007; Wang and Liu, 2007; Fu, 2015: 150). Both forms of innovation emphasise the utilisation and integration of external R&D resources and commercial paths.

With regard to the policies for open innovation, Fu (2015) categorises them into three clusters: 1) policies towards inbound open innovation (e.g. *Regulations on the Administration of Technology Acquisition Contracts (1985)*, *Regulations on Promoting Technology Introduction, Digestion and Absorption (1986)*, *Regulations in Administration of Import and Export of Technologies (2001)*, and *Notice of Taxation on Issuing State Industrial Technology Policies (2009)*); 2) policies towards outbound open innovation (e.g. *Decision on Strengthening Technical Innovation, Development of High-tech and Realisation of Its Industrialisation (1999)*, *Law of Promoting the Transformation of Scientific and Technological Achievements (1996)*); 3) and policies towards open innovation networks (e.g. *State Industrial Technology Policies of 2002*, *Decision on Further Strengthening the Intellectual Property Protection (1994)*) (Fu, 2015).

However, the most recent and comprehensive innovation policy in China is the *"Twelfth five-year" national indigenous innovation capacity-building plan* issued by the State Council in 2013. This policy aims at guiding the behaviour of innovators, directing society to enhance the building of indigenous innovation capacity, and accelerating the construction of an innovative country. Therefore, it will be the main focus of this discussion, and will be examined in detail. According to the plan, the promotion of innovation capacity-building is of great significance, for four major reasons. First, it can improve China's competitiveness as a country in the process of globalisation, where international flows of talents, techniques and other innovation elements are strengthened. Second, it promotes the achievement of science and technology breakthroughs, especially in key fields such as energy and resources, information communication, population health, modern agriculture and advanced materials. Third, it is beneficial for the transition of the economic development pattern, enabling it to move from being cost-based to being centred on quality and economic benefits. Fourth, it helps to solve problems relating to the development of society. For instance, primary public service issues concerning education, medical treatment and public health, culture, and public security can be addressed though the introduction of innovation, thereby creating a better system which ensures that social services to meet people’s needs, and finally helps to achieve a more harmonious society (State Council, 2013).

In consideration of the current weaknesses, such as scarcity of innovation resources sharing, low dynamics of innovation activities in enterprises, insufficient input and an incomplete environment for innovation, the Chinese government has emphasised on technological innovation, placing it at the centre of China’s overall development. According to the plan, the strategy for Chinese innovation policy features objectives in five key areas: 1) building essential facilities for innovation, which involves facilities for scientific research (e.g. state key laboratories, scientific research equipment, wild scientific observation and research stations), platforms for technology resource and information, and systems for measurement and approval; 2) promoting innovation in key industries including agriculture, manufacturing, strategic emerging industries (e.g. energy saving and environment protection, new IT, advanced equipment manufacturing, new energy, new materials), modern services (e.g. financial services, modern logistics, business services, high-tech services), energy and integrated transportation, as well as key society-related industries (i.e. education, medical health, culture and public security); 3) increasing the capacity of innovators by promoting enterprises’ technological innovation and R&D, building innovative service systems with SMEs, strengthening the innovation capacity of colleges, universities, and science and technology agencies, and enhancing the cooperation between enterprise and university; 4) creating collaborative systems of regional innovation, especially in the areas of the Yangtze River Delta, Pearl River Delta and Beijing-Tianjin-Hebei; and 5) improving the environment for innovation through integration of shared innovation resources, the creation, utilisation, protection and supervision of IPR (intellectual property rights), the popularisation of science, cultivation of innovation culture, and improvement of international cooperation (State Council, 2013).

In order to ensure the effective implementation of the policy, the Chinese government has also emphasised its governmental support, including overall guidance, improved laws and regulations, favourable industrial and fiscal policies, governmental investments, and an evaluation and supervision system that encourages participation from all society (State Council, 2013). Consequently, innovative enterprises can enjoy favourable tax policies and privileges. Research establishments can retain all incomes, to award researchers and fund future research projects, rather than handing them over to the central treasury. Meanwhile, researchers should be awarded with no less than 50 per cent of the transfer or licence income, or with company stocks and dividends, to provide further incentives for innovation. Both basic and advanced technological research will be subjected to peer evaluations, which involve key factors such as research quality, originality and practical values (gov.cn, 2015a). In order to create a culture of innovation, the Chinese government plans to set up a 40-billion-yuan government fund for emerging industries, to decrease regulations for inbound and outbound investment, and offer more supports for research and development. For instance, a nationwide initiative with over 1,500 incubators, operated under the Ministry of Science and Technology's Torch Programme, is aimed at providing policy, financing and consulting services for high-tech firms. The Ministry also runs an innovation fund that has channelled 3.5 billion yuan of investment into more than

3,000 projects in emerging industries (Xie, 2015). Furthermore, in accordance with the reform in higher education on innovation and entrepreneurship starting in 2015, a new innovation-and-entrepreneurship-oriented education system will be established in 2020, which highlights the integration of classroom training, self-directed learning, practice, and guidance (gov.cn, 2015b).

Moreover, on March 23 2015, the Communist Party of China (CPC) Central Committee and the State Council co-published a document called *Opinions of the CPC Central Committee on deepening the reform of the institutional mechanisms to accelerate the implementation of innovation-driven development strategy*. China's cabinet stated that by 2020, an institutional and legal framework that is conductive to innovation-driven development would be established, allowing the free movement of talent, capital, technology and knowledge; this will encourage coordinated innovation and enhance efficiency (gov.cn ,2015a).

3.1.2.2 Regional and local innovation policy in Shanghai

In terms of regional innovation, Shanghai is regarded as the centre of the Yangtze River Delta (YRD), where the Shanghai municipality, Jiangsu Province and Zhejiang Province are located, due to its great advantages in governance, economy, trade, finance and shipping. While Shanghai is famous for its internationalisation and abundant resources for innovation, including technology, talents, information, capital, and headquarters of various public, multinational, central and private enterprises, the other two provinces have their own comparative advantages: Jiangsu Province has numerous universities and colleges, and large enterprises; and Zhejiang Province has dynamic private enterprises and a huge economy, with a flexible system and mechanism. In general, the systematic regional innovation of the YRD features with Shanghai as the core; it drives the surrounding areas, which have complementary resources and demands, and thereby promotes collaborative innovation among industrial clusters (Li, 2005; Jia and Liu, 2006; Zhang, 2010).

The *Guideline for Further Promoting Reform, Opening Up and Socio-Economic Development* issued by the State Council in 2008 envisaged the national perspective of regional collaboration and regional development in the YRD area. The region was required to enhance its innovation capacity significantly, and to considerably raise the contribution that technical progress made to regional economic growth. Four objectives of regional innovation were mentioned, as follows: "to develop an internationally competitive regional innovation system; to achieve innovation breakthroughs in core technologies and in key sectors; to create a policy environment conducive to independent innovation; to increase the pool of innovation talent through regional education efforts and overseas recruitment" (Ding and Li, 2015: 157). The guideline was further supplemented by the Action Plan in 2010, which identified four essential tasks requiring regional joined-up actions on "the construction of regional centres of S&T and innovation, regional shared platforms of S&T intelligence, environmentally friendly residential places, and S&T manufacturing centres" (Ding and Li, 2015: 158). Key innovation policy tools involve financial support for regional joint innovation projects, policies to encourage the coordinated development of firms within the YRD region, policies to promote the sharing of S&T resources and joint tackling of general purpose key technologies, policies to construct information service networks and intermediary platforms, and policies to consolidate human capital and improve talent sharing (Ding and Li, 2015).

Although a part of the Yangtze Delta region, Shanghai has its own innovation policy; therefore, some regional differences exist in this policy arena. A study comparing regional innovation policies among five different Chinese provinces (Zhejiang, Guangdong, Jiangsu) and municipalities (Beijing and Shanghai) discovered that Shanghai has relatively well-developed laws and regulations on innovation, but is low in strategic measures such as policies that encourage enterprise merger and alliance, and the import and innovation of technology for certain industries (Sheng and Sun, 2013). The 36 policy instruments issued in 2006 are the major technological innovation policies in Shanghai which support the *Shanghai Medium and Long-Term Plan for Science and Technology Development (2006-2020).* Three key aspects are emphasised in the policies. First, meeting enterprises' innovation demand through policy orientation (e.g. favourable tax policies for technology development spending, depreciation of R&D instruments and equipment, and employee education funds). Second, increasing government investment in science and technology (S&T), and establishing a system of government procurement of innovative products (e.g. setting a minimum target for the ratio between input in S&T and the total government expenditure annually). Third, improving the innovation environment in terms of investment and financing, IPR, and talents-building. In addition, the policies enhance the supervision and inspection of innovation activities, and thus also point out requirements for participants. The innovation policies in Shanghai have been continuously improved and supplemented in each successive year (e.g. 19 new and revised policies in 2007; 24 new and revised policies in 2008; 32 new and revised policies in 2009) (Zhou, 2006; Shanghai Technology Innovation Centre, 2011a, 2011b).

In conclusion, this part has explored China's innovation policy in context, which thus closely links to the research objective concerning the current state of innovation in China. The innovation policy in China at present focuses on the building of an indigenous and open innovation-oriented economy by enhancing science and technology innovation, this being at the centre of China's overall development. Accordingly, priorities are given to S&T-related objectives, including facilities for innovation, platforms for technology resources and information, and systems for measurement and approval; also prioritised are key industries such as agriculture, manufacturing, strategic emerging industries, modern services, energy, integrated transportation, key society-related industries and the capacity of innovators. There is also a focus on collaborative systems of regional innovation, and an environment for innovation. Moreover, the policy is accompanied by various government supports in order to ensure its effective implementation of it. Supports mainly come from improved laws and regulations, favourable industrial and fiscal policies, governmental investments, and an evaluation and supervision system.

In comparison, innovation policies from the OECD and EU have a much broader focus: they are not only confined to S&T innovation, but also recognise the importance of workplace innovation. They involve the conditions of employment (European Union, 2010c; OECD, 2010; OECD, 2015a), which is the major difference from the policy in China. In addition, the OECD's innovation policy emphasises the use of the digital economy, characterised by the Internet and big data; while the EU's policy stresses social and territorial cohesion, as well as external leverages. Nevertheless, there are more similarities with China. For instance, priorities are commonly given to skills and training; to investment, funding and finance access; to networks and cooperation between different organisations; to the participation of various stakeholders; and the evaluation and improvement of the innovation system. Furthermore, the free flow of capital and labour resources is also regarded as vital to promote innovation, though the policies are currently at different stages.

3.2 Theories of innovation

Various innovation policies from the OECD, EU, China and many other countries and organisations indicate the fact that innovation has been widely recognised as vital in policy-making. Consequently, questions arise regarding the exact definition of innovation: Are there different types of it? How they are developed? and Why they are of importance? In order to better understand the concept, the following sections discuss theories of innovation, concerning key aspects such as its definition, classification, and various theoretical models. This helps to generate a clear picture of innovation in theory, and allows this research to later build its own model of innovation.

3.2.1 Innovation in general

The term “innovation” refers to the successful exploitation of new ideas (DTI, 2003). To be more specific, innovation is the first attempt to put an idea for a new product or process into practice; it is thus different from invention, which is confined to the first occurrence of an idea for a new product or process (Fagerberg, 2005). In order to covert invention into innovation, firms need to combine various types of knowledge, capabilities, skills and resources. Moreover, a single innovation is not an isolated event, but the result of a lengthy process involving many interrelated innovations. Also, firms depend on extensive interaction with their environment, rather than innovate in isolation. Therefore, a system-based perspective is commonly adopted among scholars who investigate innovation (Fagerberg et al., 2005; Dodgson et al., 2014).

So far, the significance of innovation has been recognised broadly by researchers, policy makers and companies. Innovation is regarded as the important driver of economic growth and development because it provides the foundation for new businesses, new jobs and productivity growth. It can help address social and global challenges such as demographic shifts, resource scarcity and the changing climate, at the lowest cost (OECD, 2015a). Moreover, it is believed that innovation plays a crucial role in long-term economic and social change. Innovation brings novelty to the economy, preventing it from being a "stationary state" with little or no growth (Metcalfe, 1998). Innovation can also cluster in certain industries or sectors; these grow more quickly, with structural changes in production and demand, and eventually undergo organisational and institutional changes. Innovative countries and regions tend to have higher productivity and income than those that are less innovative (Fagerberg, 2005). Furthermore, innovation is found to be positively related to the market competition (Soames et al., 2011); this is another empirical finding that supports the importance of innovation in today's globalised market, where competition is increasingly fierce.

Existing theories and research indicate that innovation varies. For example, the distinction between high and low innovation by R&D expenditure is widely used in international studies by the OECD, EU and international organisations (Malerba, 2005). Schumpeter's theory states that different market structures result in different innovations, by giving examples of the first industrial revolution and the second industrial revolution, respectively characterised by Schumpeter Mark I (featuring "creative destruction", with technological ease of entry, and a major role played by entrepreneurs and new firms in innovative activities) and Schumpeter Mark II (featuring "creative accumulation", with the prevalence of large established firms and relevant barriers to entry for new innovators) (Malerba, 2005). Technological regimes theory (Nelson and Winter, 1982) suggests that the nature of the problem firms have to tackle in their innovative activities varies. Pavitt (1984) proposes that innovation sources and the appropriability mechanisms result in different patterns for innovative activities. By using the "five forces" framework, which comprises the threat of new entrants, threat of substitutes, bargaining power of suppliers, bargaining power of customers, and competitive rivalry, Porter (1979 & 1985) stresses competitive advantage and firm strategy in designing, producing and commercialising products. Malerba (2005) proposes a comprehensive approach, including elements of knowledge and technology, actors and networks, and institutions, to analyse sectoral differences in innovation. Therefore, there are different innovations, and the following paragraphs introduce different types of innovation in literature.

In terms of the types of innovation, there are several means of classification. For instance, Schumpeter (1934) identifies five different types of innovation, comprising new products, new methods of production, new sources of supply, the exploitation of new markets, and new ways to organise business. The product innovation and process innovation, in comparison, have become the focus of various studies. While the former is about the creation and launch of new goods and services, the latter refers to changes in operations, tasks, and ways of working in organisations (Dodgson et al., 2014). Edquist et al. (2001) suggest dividing the category of process innovation further into technological process innovation and organisational process innovation. Henderson and Clark (1990) introduce the concepts of architectural innovation and modular innovation, stating that architectural innovation involves changes in the interfaces between different components or aspects of knowledge, which may lead to significant new ways of bringing together elements of new products or processes, but do not themselves require the development of new products. Modular innovation, by contrast, requires significant changes in a single component of a product, but the changes do not affect how components work with each other (Dodgson et al., 2014).

From the perspective of degree of change, another approach, based on Schumpeter's (1934) work, is given by Freeman and Soete (1997), who distinguish two types of innovation: incremental innovation (continuous improvements) and radical innovation (radical improvements). Although Schumpeter considers the latter to be more important, the cumulative influence of incremental innovation is believed to be great as well (Lundvall, 1992). In fact, radical innovation is rare, being infrequent in most industries and occurring every 30 years (Tushman and Anderson, 1986; Anderson and Tushman, 1990; Dodgson et al., 2014). According to Dodgson, et al. (2014), most change brought about through innovation concerns evolutionary, incremental adaptations of existing elements, products and technologies.

Christensen (1997) introduces another type of innovation: the disruptive innovation. This model describes a phenomenon whereby companies that continuously improve their products may end up offering products that are over-performing for the needs from the market; they are thus likely to be attacked by other companies that provide inferior products, which are nonetheless "good enough" for customers, and beat incremental innovators on price or irrelevant performance dimensions (Dodgson et al., 2014). According to Christensen (1997), there are two forms of disruption: low-end disruption addresses over-served customers with a lower-cost business model, while new-market disruption competes against non-consumption.

A recent work by Jensen et al. (2007) determines two modes of innovation:

the science, technology and innovation (STI) mode, and the doing, using and interacting (DUI) mode. The STI mode is based on the "production and use of codified scientific and technical knowledge". Even if the problem starts locally, this mode of learning will make use of "global" knowledge throughout, and will result in "potentially global knowledge". The DUI mode, in contrast, relies on "informal processes of learning and experience-based know-how and know-who which is often highly localised". This mode can be fostered by building structures and relationships which promote learning by "doing, using and interacting". Especially, the performance of innovation can be enhanced by organisational practices such as project teams, problem-solving groups, and job and task rotation (Lundvall and Nielsen, 1999; Michie and Sheehan, 1999; Laursen and Foss, 2003; Lorenz et al., 2004; Lorenz and Valeyre, 2006; Jensen et al., 2007: 680-693).

In this respect, it is noteworthy that according to a report from the OECD (2010), the underlying approach to innovation has been changing; from models largely focused on R&D (research and development) in knowledge-based globalised economies, to other major sources of innovation, especially the work organisation. The concept of the learning organisation is therefore introduced, in which "work organisations support innovation through the use of employee autonomy and discretion, supported by learning and training opportunities" (OECD, 2010: 9). Despite the recognition of the broader approach to innovation (i.e. non-technological innovation) in policy, there is a considerable gap between policy intent on the one hand, and policy implementation, measurement and evaluation on the other (Makó et al., 2016). This means that policy stresses both types of innovation, but in practice it moves back to the technological one when providing action plans and measures for innovation. In addition, the dominance of technological innovation in policy is challenged by evidence which suggests that organisational innovation plays a major role that informs innovativeness, and that there are clear synergies to be gained from this form of innovation and technological forms (Battisti and Stoneman, 2010; Makó et al., 2016). Moreover, it is generally accepted that most innovation is not radical but incremental, and growing evidence indicates the emergence of radical innovation generated by employee-driven innovation (Kesting and Ulhoi, 2010). Consequently, there is a need for both policy and scientific communities to better articulate the broad approach to innovation, in order to explain and understand more effectively its advantages, as well as to better integrate research and policy in innovation (Makó et al., 2016). This other type of innovation, although little reflected in policy, has aroused academic debate. The next section looks at theories of organisational innovation, a concept which is attracting increasing attention.

3.2.2 Organisational innovation

Generally, organisational innovation refers to the creation or adoption of an idea or behaviour that is new to the organisation (Daft, 1978; Damanpour and Evan, 1984; Damanpour, 1996). It includes business practices (e.g. knowledge sharing, staff development), workplace organisation (e.g. devolution of decision-making to employees), external relations (e.g. between employees in one part of an organisation and those of other departments or externally) and other innovations (e.g. use of variable pay as a change to reward systems, or atypical employment contracts) (Eurofound, 2013). Workplace innovation, being more narrowly focused on innovation within the organisation rather than in wider society, is defined by Pot (2011: 404-405) as “the implementation of new and combined interventions in the fields of work organisation, HRM and supportive technologies". According to the European Commission, workplace innovation "improves motivation and working conditions for employees, which leads to increased labour productivity, innovation capability, market resilience, and overall business competitiveness" (European Commission, 2015b). It is believed to be a prerequisite for technological developments because they encompass the process changes required "to change the beliefs, attitudes, values, and structure of organisations so that they can better adapt to new technologies, markets, and challenges" (Ramstad, 2008: 29; Eurofound, 2013: 9). Consequently, by making optimal use of the potential workforce, workplace innovation can be critical for improvements in overall productivity and competitiveness (Pot, 2011).

The existing literature on organisational innovation is very diverse, and is not well integrated into a coherent theoretical framework. There are essentially three different streams (Lam, 2005). Firstly, the organisational design theories, which focus on the link between structural forms and the propensity of organisations to innovate, aim to identify the structural characteristics of innovative organisations. Burns and Stalker (1961) group organisations into two main types, "mechanistic" and "organic", with the former being more rigid and hierarchical, suited to stable conditions, and the latter having a more fluid set of arrangements, adapting to conditions of rapid change and innovation. Based on Burns and Stalker's model, Lawrence and Lorsch (1967) note that both mechanistic and organic structures can coexist in different parts of the same organisation, due to the different demands from the functional sub-environments. Their suggestion is reflected in the contemporary debate about developing a combined mode of organisations; i.e. "ambidextrous organisations" that are capable of dealing with both evolutionary and revolutionary technological changes (Tushman and O'Reilly, 1996; Lam, 2005). Mintzberg (1979) identifies five archetypes (i.e. simple structure, machine bureaucracy, professional bureaucracy, professional bureaucracy, divisionalised form, adhocracy), each with a different potential for innovation. For instance, bureaucratic structures are suitable for providing a stable environment, but are not innovative. Adhocracies, in contrast, are highly adaptive and flexible, capable of radical innovation in fast-changing environments. Contingency theories explaining the diversity of organisational forms in different environments assume that as complexity and uncertainty in technology and product markets increase, along with the rising heterogeneity and unpredictability of task activities, more adaptive and flexible structures will be adopted by organisations as they move from bureaucratic to organic forms of organising (Lam, 2005). In addition, Teece (1998) argues that not only the formal (governance modes) and informal (cultures and values) structures of firms, but also their external networks, have a powerful impact on the rate and direction of their innovative activities. He notes that smaller autonomous structures (e.g. "virtual" firms) which achieve necessary coordination through an arm's-length arrangement in the open market can often develop autonomous innovation, which can be introduced to the market without the extensive modification of products and processes. Integrated enterprises, by contrast, are more likely to advance systemic innovation, which requires complex coordination among various subsystems, but is achieved under one "roof" (Teece, 1998).

The second main stream of theory concerns organisational cognition and learning, which focuses on the micro-level process of how organisations develop new ideas to solve problems through learning and knowledge creation (Agyris and Schon, 1978; Nonaka, 1994; Nonaka and Takeuchi, 1995). They view innovation as such a process and believe that organisations with different structural forms vary in their patterns of learning and knowledge creation; this leads to different types of innovation capabilities (Lam, 2005). There are various models of new organisations in the literature relating to organisational learning and innovation. Lam (2005) groups them into two polar ideal types, namely “J-form” and “adhocracy”. The J-form, best illustrated by the Japanese types of organisations (Aoki, 1988; Nonaka and Takeuchi, 1995), represents organisations that are good at cumulative learning, and which derive their innovative capabilities from the development of organisation-specific collective competences and problem-solving routines. This type of organisation is capable of achieving incremental innovation and performing well in relatively mature technological fields that feature great opportunities for combinations and incremental improvements of existing components and products (e.g. machine-based industries, electronics components, automobiles) (Lam, 2002; Whitley, 2003; Lam, 2005: 128). Adhocracy (Mintzberg, 1979), according to Lam (2005), is a kind of organisation which relies more on individual specialist expertise organised in flexible market-based project teams that are good at responding quickly to changes in knowledge and skills, as well as integrating new expertise to develop brand new products and processes. This form or organisation is very adaptive, being suitable for dynamic learning and radical innovation. However, problems such as knowledge accumulation can occur, due to its fluid structure and speed of change (Lam, 2005).

Finally, the third stream of research focuses on organisational change and adaptation. In this sense, innovation is regarded as a capacity to respond to changes in the external environment, and to affect and shape it (Burgleman, 1991; Child, 1997). Views are divided into three categories. First, organisational ecology (Hannan and Freeman, 1977; Hannan and Freeman, 1984), institutional theories (DiMaggio and Powell, 1983; Zucker, 1987; Greenwood and Hinings, 1996), and evolutionary theories (Nelson and Winter, 1982) stress the powerful force of organisational inertia, and argue that organisations only respond slowly and incrementally to environmental changes. The second view, the punctuated equilibrium model (Gersick, 1991; Romanelli and Tushman, 1994), suggests that organisations evolve through long periods of incremental and evolutionary change punctuated by relatively short bursts of discontinuous or fundamental change (revolutionary periods). The last view, derived from theories of strategic organisational adaptation and change (Child, 1972; Weick, 1979; Burgleman, 1991; Child, 1997) is distinctive. By emphasising the role of managerial action and organisational learning, as well as the significance of continuous change and adaptation to a turbulent and uncertain environment, it is realised that organisations are not always the passive recipients of environmental forces, but also have the ability to affect and shape the environment (Lam, 2005).

3.2.3 Innovation and job quality

Recent research indicates a link between innovation and job quality. The term "job quality" in theory is a multidimensional concept consisting of different aspects related to jobs. The following chapter (Chapter 4) focuses on this and discusses it specifically. Although linking innovation to job quality is relative new, there is an indication of the potential relationship between the two from the "good jobs, bad jobs" literature (Kalleberg, 2011), as it involves definitions of good jobs associated with investments in skills, qualifications and training, which echo some aspects of job quality emphasised in the innovation literature. For example, innovation policies commonly value knowledge and skill development, and education and training, aspects of job quality, as important foundations to innovation, as shown from the discussion of innovation policy in the OECD, EU and China in this chapter. Innovation theories are also closely related with knowledge, skills and learning, e.g. learning organisations (Lundvall, 2010). Thus, the overlap between innovation and job quality indicates that they are linked through certain aspects that are essential to both. More specifically, a recent work by Muñoz-de-Bustillo et al. (2016) proposes four mechanisms between innovation and job quality. The first mechanism indicates that through a growth in productivity, innovation leads to increased wages and decreased working time, thus improving job quality. The second mechanism explains that innovation has an impact on the nature of jobs through changes in the working conditions and environment. The third mechanism states that innovation in structural change, including production and employment, can influence job quality. Finally, the fourth mechanism indicates job quality can in turn promote innovation (Muñoz-de-Bustillo et al., 2016).

Apart from the theoretical concept given above regarding the link between innovation and job quality, there are also empirical suggestions of a two-way link, meaning innovation impacts on job quality and can also be influenced by job quality. On the one hand, innovation-related issues are found to have impacts on job quality aspects. For instance, Dailey et al. (2015) describe findings from national research in the US, and identify innovative workplace practices designed to improve the lives of direct care workers who serve individuals with mental health and substance use conditions. This is accomplished mainly through the following six aspects: 1) supporting educational and career development; 2) increasing wages and benefits; 3) creating workforce development partnerships; 4) using evidence-based practices to train staff and assess service fidelity; 5) strengthening supervision; and 6) employing people in recovery in direct care roles. Building on the interactionist approach and the consideration of service organisations as open systems, another study in Spain (García-Buades et al., 2016) made multilevel analyses on a sample of 599 customers, 344 boundary employees and 86 supervisors nested in 86 teams from 60 hotels; it found significant positive direct relationships between team engagement and service performance indicators (functional and relational service quality, overall satisfaction, and loyalty). The relationship becomes stronger when the climate for innovation improves. The study concludes that climate for innovation is a facilitator of the connection between internal and external success components of organisational life, because there is a crossover process from team engagement (internal facet) to customers' evaluations of service performance (critical external stakeholders); especially when the situational context stimulates innovation and the recognition of employees' ideas and suggestions, in order to improve work methods and the service delivered (García-Buades et al., 2016). Therefore, innovation is beneficial to business performance and is key to both internal and external organisational life.

On the other hand, some research investigates different job quality aspects and discovers their impacts on innovation in organisations. For example, a study by Yuan and Woodman (2010) explains employees' innovative behaviour with performance and image outcome expectations, including expected positive performance outcomes, expected image risks, and expected image gains. These expectations are shaped by contextual and individual difference factors, including perceived organisational support for innovation, supervisor relationship quality, innovativeness as a job requirement, reputation for being innovative, and dissatisfaction with the status quo (Yuan and Woodman, 2010). Similarly, from the perspective of psychology, Bysted (2013) points out that job satisfaction and mental involvement have positive moderating effects on the inner environment[3], thus affecting innovative work behaviour. He also finds that innovation trust (a positive view and acceptance of innovation) is an important contextual

[3] According to Bysted (2013), the inner environment is composed of job autonomy and innovation trust.

variable, as it turns dysfunctional innovative environments into dynamic and functional environments through reduced perceived riskiness and negative reactions caused by innovative work behaviour (Bysted, 2013). Moreover, by collecting data from front-line employees from mid- or upscale hotels in Taiwan through a self-administrated questionnaire, a study has found a positive relationship between organisational training and service innovation performance, with two moderators of person-job fit and work schedule flexibility (Chen, 2017). Another research, conducted in Ghana, indicates that knowledge sharing, job satisfaction, workplace friendship and employee commitment predict service innovation (Okoe et al., 2017). In summary, while innovation can improve job quality, job quality also promotes innovation.

In conclusion, innovation is important to the long-term growth of the economy, especially in the global market where competitions is becoming increasingly fierce. The types of innovation are various, according to different standards of classification. For example, from the perspective of innovation objects, it is generally divided into product innovation and process innovation; while in terms of the method of innovation, there are architectural and modular types. More commonly, it is often divided into incremental and radical, which involve continuous improvements and radical improvements respectively. The STI mode and DUI mode proposed by Jensen et al. (2007) are based on different processes. The former, relying on “production and use of codified scientific and technical knowledge”, makes use of global knowledge throughout and eventually gains potentially global knowledge. The latter, on the other hand, based on “informal processes of learning and experience-based know-how and know-who which are often highly localised”, can be promoted particularly by organisational practices which encourage learning by “doing, using and interacting” (Jensen et al., 2007: 680-693). Moreover, according to the

OECD (2010), there is a trend that innovation is currently shifting from the traditional type, based on science and technology, to the organisational one, which is regarded as equally important and a major source of innovation. Furthermore, recent literature shows the link between innovation and job quality.

3.3 The author's innovation model

The previous section has evaluated various theories of innovation. As has been identified, there are different types of innovation according to distinctive standards of classification. Also, there are debates among scholars who investigate similar types of innovation to a certain degree, thus constituting several streams in academic research on innovation. This research, in comparison, also investigates innovation, but it is in the Chinese context. Therefore, it is necessary to define the scope of this research as well as the measurement of innovation, in order to clarify the research focus and to achieve consistency throughout the entire research.

The following part starts by describing the innovation model from the *Oslo Manual* (2005), which is "the foremost international source of guidelines for the collection and use of data on innovation activities in industry" (OECD.org, 2015). This is taken as a primary reference for building the innovation model in this research, because the *Oslo Manual* is an international benchmark that is used by China. Next, by analysing the current innovation system and capability in China, a discussion is made regarding which type of innovation will be the main focus of this research. Then, the measurement of innovation, another key aspect, will be discussed in order to identify the measuring indicators for this research.

3.3.1 Innovation models

The *Oslo Manual* (2005) gives clear operational definitions of innovation that can be used in standardised surveys of firms: it distinguishes innovation into the four categories of product, process, marketing and organisational (see Table 3.2). The first two, product innovation and process innovation, are both related to technology; while the latter two, marketing innovation and organisational innovation, are quite different, "broadening the range of innovations covered by the Manual as compared to the previous definition" (Oslo Manual, 2005: 47). Therefore, product innovation and process innovation can be classed as types of technological innovation, with marketing innovation and organisational innovation regarded as non-technological innovation. Although different, the four types have a common feature: they must have been "implemented" (Oslo Manual, 2005: 47).

Table 3.2 Types of innovation from the *Oslo Manual*

Technological innovation		**Non-technological innovation**	
Product innovation	Process innovation	Marketing innovation	Organisational innovation

Product innovation, according to the Manual, refers to the "introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses, including significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics" (Oslo Manual, 2005: 48). It can be based on either new knowledge and technologies, or new uses or combinations of existing knowledge and technologies, covering both goods and services. Process innovation, in comparison, describes the "implementation of a new or significantly improved production or delivery method, including significant changes in techniques, equipment and/or software, aimed at cutting the unit costs of production or delivery to improve quality or to produce or deliver new or significantly improved products". According to the *Manual*, process innovation not only involves "new or significantly improved methods for the creation and provision of services", but also covers "new or significantly improved techniques, equipment and software in ancillary support activities such as purchasing, accounting, computing and maintenance" (Oslo Manual, 2005: 49).

Marketing innovation, quite differently, is defined as "the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing, which intends to better address customer needs, to open up new markets, or to newly position a firm's product on the market with the objective of increasing the firm's sales". Importantly, the key difference between marketing innovation and other changes in marketing instruments lies in the implementation of marketing methods that have not been previously used by the firm. Therefore, marketing innovation generally does not include seasonal, regular or other routine changes in marketing instruments (Oslo Manual, 2005: 49-51). Finally, organisational innovation is "the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations, which can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (e.g. Non-codified external knowledge) or reducing costs of supplies" (Oslo Manual, 2005: 51). Similarly, organisation innovation differs from other organisational changes in that here a firm implements an organisational method that has not been used before, and which is the outcome of strategic decisions by management.

According to the *Manual*, there are various approaches of data collection regarding innovation, depending on the objectives and scope of the survey. While a comprehensive approach covers all four types equally, many other approaches have a focus on particular innovations. For instance, "product and process innovations might be maintained as the core innovation types but marketing and organisational innovations might be partly covered, or product and process innovations might be the exclusive focus". Or additionally, by applying specialised surveys, one or more types of innovation can be covered in greater detail (Oslo Manual, 2005: 59). As stated by the *Manual*, it is not recommended to cover all topics and subtopics in one innovation survey; rather, surveys should choose questions that are believed to be the most relevant. Furthermore, by giving examples of production operation restructuring, which can involve process, organisational and marketing innovation, and implementation of marketing and organisational innovation in order to better profit from a product innovation, it is noted that "innovations spanning more than one type might play an increasingly important role in firm competitiveness and in productivity gains" (Oslo Manual, 2005: 60). Consequently, the *Oslo Manual* (2005) provides a useful guideline for research on innovation. However, with regard to the specific model of innovation used in this research, it is important to consider the particular context in China, as this is closely related to the significance and feasibility of conducting this research.

3.3.2 The innovation system of China

From the perspective of national innovation system (NIS), Nelson (1993), the most cited academic in this area, explains the concept as any institutional actors that can impact on the innovative performance nationally, but not necessarily restricted to governmental nation because innovative business can be transnational. His work highlights institutions and mechanisms in supporting technical innovation and the country differences due to the variations in economic and political circumstances and priorities. It points the important factors such as a country's size, resource endowments, conscious decisions to develop and sustain economic strength in certain areas, as well as the education and training systems, and the package of fiscal, monetary and trade policies, which affect firms' ability and incentives to innovate. Although Nelson's work on NIS provides an in-depth analysis among a wide range of countries, it does not include China. China is unique as it has different conditions from other countries, in terms of the factors mentioned above, which shape its NIS. As such it has and which creates a unique model.

There has been a reorganisation of the concept of China's NIS since 2006 to include "a system with a purposeful combination of market and non-market mechanisms aiming to optimise the production, development, and use of new knowledge for sustainable growth, through institutionalised processes in the public and private sector" (OECD, 2008; Dodgson, 2014: 360). Accordingly, not only does the institutional setting and policy framework play an important role, but also the interplay of multiple players in the system, including enterprises (key actors), industry, research institutes and universities, has a significant impact on the national innovation capability (Dodgson, 2014). The key point to note is that China has adopted an indigenous and open innovation-oriented policy focusing on science and technology innovation (also known as "technological innovation"), supported by various instruments that are mostly related to science and technology. Objectives and efforts are made largely in terms of science and technology development, leading to an innovation model that is largely focused on research and development. For instance, the 15-year science and technology development blueprint *National Innovation Strategy* launched in 2006 sets a goal for R&D spending to increase from 1.2 per cent of GDP to more than 2.5 per cent by 2020, which is slightly higher than the average level for OECD countries. The Chinese government also makes large investments in science and technology (e.g. US$ 77.82 billion in 2011), in order to establish the foundation of a world-class innovation system (Fu, 2015). Therefore, unlike OECD countries where attention has been shifting from science and technology innovation to organisational innovation, China, in the current context, still places technological innovation at the centre; and awareness of non-technological innovation has not yet been widely generated.

Since 2006, four major changes have been made in the NIS. First, the system restructures national S&T programmes and groups them into major special programmes and basic programmes. On the one hand, the major special programmes refer to the most essential programmes that aim to make breakthroughs in development of strategic products, industrial generic technologies and major S&T projects; while on the other hand, the basic programmes are the basic form of government support for S&T, made up of major basic and applied research, policy guidance programmes for the creation of an innovation-friendly environment conducive to enterprise-led innovation, and programmes aiming to meet the specific needs of technological innovation. Second, great efforts (e.g. the innovative enterprise pilot scheme in 2008, four industry-specific strategic innovation alliances) have been made to implement a "technological innovation guiding project", which utilises policy instruments to lever the mainstay position of enterprises in innovation activities. Third, there is a shift to concentrate on the development of innovation-oriented financial instruments (e.g. the SME Innovation Fund). Fourth, for approval of S&T projects and coordination of project implementation, both “cross-ministerial department meetings” at the central level and “ministerial and provincial meetings” across central and regional level have been established (Ding and Li, 2015).

So far, China has achieved promising progress with its S&T development strategy, which is supported by the Chinese government mainly in terms of advancing national technological innovation projects and promoting enterprises to become genuine actors of technological innovation. As a result, China has become a leader in superconductor, large-scale water-turbine generator set manufacturing, and in aerospace. With its higher education industry having transformed from elite education to mass education, China now has more talent resources than before in the form of graduates of domestic higher-education institutions (HEIs) and returnees from abroad. Furthermore, research institutions, colleges and universities with high S&T competence are increasing, accompanied by various national science programmes and foundations (Ding and Li, 2015). As Ding and Li (2015: 29) summarise, “China has established a relatively comprehensive system of modern S&T and generated a large pool of scientists and engineers”. Its overall level of S&T development enjoys a leading position among developing countries, and scientific research in some fields has achieved excellence internationally (Ding and Li, 2015).

However, Dodgson et al. (2014) argue that China’s NIS is still embryonic, due to reasons such as weak linkages between actors and among subsystems (regional and industry) (see also Gu and Lundvall, 2006; Dodgson and Xue, 2009), limited synergies within system and spillover effects, and a lack of a long-term vision for most R&D activities. Despite an overall coherent innovation framework given by the government, another study by Kafouros et al. (2015) reports a regional difference in China’s NIS, based on an investigation of R&D intensive firms. It finds significant within-country variations in three areas, including IPR enforcement, international openness, and quality of universities and research institutes; this challenges the assumption of institutional homogeneity within a given country, showing an uneven institutional evolution across different regions in China, as well as explaining the different innovation outcomes achieved among similar partners in different regions of the same country. It concludes that such sub-national institutional variations influence the relationship between academic collaborations and firms' innovation performance profoundly, and the value of academic collaborations depends on the specific combinations of firm-specific factors and local-specific institutions, stressing the sub-national differences neglected by previous studies. In addition, it also points that academic collaboration improve firm's innovation performance but only to a certain threshold, due to a negative marginal effect found when a firm over-utilises the external knowledge with limited absorptive capacity and limited internal R&D capability, causing problems such as difficulty in value creation management of external-oriented innovation processes, and the challenges occurred by over-search and over-openness. Thus, despite the benefits of research cooperation commonly emphasised in innovation policies, it is important for Chinese firms to consider the extent to which academic collaboration can be achieved, and to strike a balance between the development of internal innovative (and absorptive) capabilities and reliance on external source of knowledge.

In summary, the NIS is different from those found in other countries and is still developing. It is, however, clearly centred on technological innovation in the form of either product or process innovation. This approach has led to a significantly improved capability for technological innovation, though empirical research suggests some imperfections and unevenness still exist within the system. It is of practical significance, therefore, to investigate

S&T innovation in this research, as China is currently dominated by this type of innovation. Meanwhile, in consideration of the Chinese innovation capability and issues of data availability, choosing S&T innovation is most appropriate, because most of the innovations in China currently belong to the S&T type. There are very limited data on other types of innovation, including marketing innovation and organisational innovation.

3.3.3 Measuring innovation

The measurement of innovation has undergone continuous development, resulting in various innovation indicators being adopted by different countries and organisations. In spite of the differences, some similarities commonly exist; for instance, the measurement approaches established by the OECD and EU are the most influential ones. Therefore, this section first discusses the most popular approaches and indicators that are applied internationally for innovation measurement. It then moves to the question of how China measures innovation at three levels, namely national, regional and enterprise levels. Finally, the innovation indicators used in this research will be identified.

As Smith (2005) summarises, there are traditional approaches for measuring innovation, as well as new approaches. Major traditional approaches are characterised by “three broad areas of indicator use in STI (science and technological innovation): first, the R&D data; second, patent applications, grants and citations data; third, bibliometric data (data on scientific publication and citation)”. In addition, other major classes of traditional indicators include “technometric indicators” for evaluating the technical performance features of products; “synthetic indicators”, mainly developed by consultants for scoreboard purposes; and “databases on specific topics” by individuals or groups (Smith, 2005: 152).

R&D comprises “both the production of new knowledge and new practical applications of knowledge”; this covers three different types of activities, including basic research, applied research, and experimental development, classified by their distance from application (OECD, 2002; Smith, 2005: 153). Although R&D data are constrained because they only measure the innovation inputs (Kleinknecht et al., 2002), such information has more advantages, such as “the long period over which it has been collected, the detailed subclassifications that are available in many countries, and the relatively good harmonisation across countries” (Smith, 2005: 154). The patent system, however, records information about new technologies derived from inventive activities with commercial promise; such data are detailed and easy to access, thus providing favourable advantages as an innovation indicator. In contrast, the bibliometric data, which deal with scientific publication and citation, are more closely related to the dynamics of science rather than innovation (Smith, 2005).

Apart from the major traditional innovation approaches mentioned above, new approaches have emerged in recent years, which can be generally categorised into two types: the “subject” approach and “object” approach. The subject approach focuses on the innovation agents and firm-level innovation activities that concern innovation inputs (R&D and non-R&D) and outputs (usually of product innovations), while the object approach focuses on the objective output of innovation process, typically the significant technological innovations (Archibugi and Pianta, 1996; Smith, 2005: 160-161). Smith argues that “both approaches define an innovation in the Schumpeterian sense, as the commercialisation of a new product or process”, but there is a tendency that the object approach focuses on radical innovation, and the subject type includes “small-scale, incremental change” (Smith, 2005: 161). The most important example of the object approach given by Smith (2005) is the Science Policy Research Unit (SPRU) database, which collects information on major technological innovations in British industry, ranging from sources and types of innovation, industry innovation patterns, to cross-industry linkages, regional aspects and so on. In comparison, the subject approach is adopted by both the OECD and EU, and thus has a wider application than the object approach. The OECD offers a guideline for innovation research through the *Oslo Manual,* first published in 1992, with the latest 4th edition published in 2018. According to the Manual, both qualitative and quantitative data on innovation activities can be collected through innovation surveys (see Table 3.3). While qualitative data involve “questions on whether or not enterprises have engaged in innovation activities”, quantitative data relate to “questions on expenditures for an innovation activity” (OECD, 2005: 97). The *Oslo Manual*’s classification of innovation activities for data collection mostly involves technological innovation. The EU follows the *Oslo Manual* and has applied the *Community Innovation Survey*, and more recently the *Innovation Union Scoreboard* (2015); the latter adopts 25 innovation indicators from the perspective of enablers, firm activities, and outputs relating to innovation (see Appendix 1). According to Smith (2005), the new approach from the OCED and EU allows consistency among the concepts of change, novelty and commensurability; it also attempts to estimate expenditures on categories of innovation activity other than R&D, because firms also invest in a wide range of non-R&D activities. Consequently, it is more advanced than the traditional measuring methods. However, it should be noted that the OECD and EU’s approaches to measuring innovation are mostly related to technological innovation.

Table 3.3 The *Oslo Manual*’s classification of innovation activities for data collection

Types	Activities
Research and experimental development	Intramural (in-house) R&D
	Acquisition of extramural R&D
Activities for product and process innovations	Acquisition of other external knowledge
	Acquisition of machinery, equipment and other capital goods
	Other preparations for product and process innovations
	Market preparations for product innovations
	Training
Activities for marketing and organisational innovations	Preparations for marketing innovations
	Preparations for organisational innovations

Source: Oslo Manual, 2005: 97-98.

In China, the establishment of a national innovation survey system was proposed in the National Science and Technology Innovation Conference held by the Central Party and State Council in July 2012. In 2013, the Scheme for *National Innovation Survey Monitoring and Assessment System* was generated, involving key surveys with different focuses, such as national level, regional level, company level, and typical innovation-intensive areas. For instance, the national-level survey investigates the overall innovation capability of China as a whole in comparison with other countries in the world, while the regional-level survey stresses the regional differences of innovation capability within China. The enterprise-level survey focuses on firms' innovation activities. In accordance with the *Oslo Manual*, which is used by the EU and OECD, the system identifies different innovation indicators in different surveys. For example, the *National Innovation Capability Survey* (see Appendix 2) consists of 33 indicators belonging to five main categories: innovation resources, knowledge creation, enterprise innovation, innovation performance and innovation environment. The *Regional Innovation Capability Survey* (see Appendix 3), in comparison, has more indicators (53 innovation indicators) ranging from innovation environment, innovation resources and enterprise innovation, to innovation outputs and innovation effects. The indicators in the *Enterprise Innovation Capability Survey* (see Appendix 4) are more subdivided, but they generally involve four broad areas (i.e. innovation inputs, synergy innovation, intellectual property rights, innovation incentives). The Chinese government provides the frameworks of innovation indicators for the three surveys, but unfortunately the relevant data are not available. Nevertheless, the *China Science and Technology Statistical Yearbooks* provide some relevant data relating to technological innovations, such as R&D, patent and technology activity data. Therefore, this research chooses to establish its own analytical framework for innovation, including R&D, patents and innovation activity indicators. The innovation model used for this research is characterised by technological innovation, which includes product and process innovations as the core innovation type; in the Chinese context, this is due to the dominance of technological innovation, where policy focus and available data are centred. The generation of a specific innovation framework is presented in the research design chapter.

3.4 Conclusion

This chapter has provided an in-depth discussion of innovation, mainly from the perspectives of policy, theory, and the model of innovation for this research. The Chinese innovation policy, which is closely linked to the research objective of identifying the current state of innovation in China, focuses on the building of indigenous innovation by enhancing science and technology innovation through various related objectives. This involves facilities for innovation, platforms for technology resource and information, and systems for measurement and approval; key industries include agriculture, manufacturing, strategic emerging industries, modern services, energy and integrated transportation, and key society-related industries.

The policy also focuses on the capacity of innovators, collaborative systems of regional innovation, and the environment for innovation. Simultaneously, the policy is supported by the Chinese government through measures such as improved laws and regulations, favourable industrial and fiscal policies, governmental investments, and an evaluation and supervision system, in order to implement the policy effectively. In comparison, innovation policies from the OECD and EU have a much broader focus, which emphasise S&T innovation as well as stressing the significance of non-S&T innovation such as workplace innovation. The OECD's innovation policy emphasises the use of the digital economy, which is characterised by the Internet and big data, while the EU's policy stresses social and territorial cohesion, as well as external leverages. Nonetheless, there are more similarities among the policies, as priority is commonly given to areas such as skills and training; investment, funding and finance access; networks and cooperation between different organisations; participation of various stakeholders; evaluation and improvement of the innovation system; and free flow of capital and labour resources.

Various theories of innovation, on the other hand, believe innovation to be important to long-term economic growth. Such theories classify innovation into different types; one of the most popular classifications is based on innovation objects, and distinguishes product innovation from process innovation. Another popular approach distinguishes between incremental and radical innovations; these involve continuous improvements and radical improvements respectively. More recently, the DUI mode and STI mode of innovation are based on different processes, with the former relying on "production and use of codified scientific and technical knowledge which are finally globalised", and the latter being based on "informal processes of learning and experience-based know-how and know-who which are often highly localised" (Jensen et al., 2007: 680-693).

Moreover, there is a trend that innovation is currently shifting from the traditional type, based on science and technology, to the organisational one, regarded as equally important and a major source of innovation (OECD, 2010). Recent research also indicates a link between certain types of innovation and specific aspects of job quality in companies and organisations.

Despite acknowledging of the importance of these other types of and approaches to innovation, most policy and measurement still heavily emphasise the STI mode. Various data and Chinese innovation policies show that China is currently dominated by science and technological innovation (or technological innovation) and has built relevant capability in pursuit of its policy objectives, which place S&T innovation at the centre. Therefore, this research will mainly investigate the S&T innovation in China, including product innovation and process innovation. The innovation model adopted for this research focuses on technological innovation; not only because technological innovation is the policy focus, but also due to the availability of data. In terms of measuring indicators of innovation, the traditional R&D and patents indicators are essential, as they are closely related to S&T advances and technological innovation. In addition, other indicators based on innovation activity, as recommended by the *Oslo Manual*, are also valuable as a means of reflecting other non-R&D activities.

Chapter 4. Job quality policy, theory and model

This chapter focuses on job quality from different perspectives. First, by referring to various job-quality improvement policies from key international organisations, as well as those in China, a comparison is made to identify the similarities and differences among job quality policies in distinctive contexts. In addition to the great benefits brought by high-quality jobs, the growing popularity of such policy also triggers a heated debate on what it involves. Therefore, the second part of this chapter discusses the definition and measurement of job quality by referring to related academic theories. Different disciplines tend to assess job quality according to different aspects, but this will help gain a better understanding of job quality, as well as assist the design of a job quality model in this research. Finally, the last part concerns building a job quality model for this research, based on the review of existing models and the data availability in China.

4.1 Policy and job quality

Job quality has been drawing the attention of policy makers in recent years; not only among the international organisations in major advanced economies, but also in developing countries. This section discusses the policy issues associated with job quality in different contexts. First, by analysing the job quality policy in key organisations such as the OECD, EU and UN, conclusions are drawn regarding the general job quality policy orientation among different organisations and countries. Then, by focusing on China in particular, the policy relating to job quality in China is explored, including laws, regulations and government initiatives. The purpose of this section is to explore different job quality policies among the world's governments, as well as to discover the importance of job quality in China, and the extent to which job quality has gained attention from the Chinese government.

4.1.1 Job quality policy in key organisations

4.1.1.1 OECD job quality policy

The OECD has always paid great attention to the employment and labour market issues of its member countries. However, it was not until 2014 that it gave a clear definition and approach to measuring job quality (OECD, 2014), and mentioned the importance of strengthening job quality in its policies. According to the OECD, not only is the number of jobs critical to the economy during recovery from recession, but also the quality of jobs is significant to workers, as it closely relates to their well-being. Recently, the OECD has emphasised the job quality in developing countries, where jobs are often marked with low quality (e.g. low pay, high risks, worsening working conditions, long working hours). By giving an example of “the large share of labour force employed in the informal economy, outside the reach of regulation and without access to social protection” (OECD, 2015b: 214), the OECD stresses that job quality is more important in developing economies. Therefore, the following paragraphs discuss the latest OECD job quality policy for developing countries.

An analysis of job quality in developing countries, including China, has been made by the OECD based on the new *OECD Job Quality Framework* (OECD, 2014). The analysis draws a detailed picture of cross-country differences in job quality and differences in socio-demographic characteristics. Through the analysis, a set of policy orientations to encourage high-quality jobs are given, covering key perspectives of social protection systems and labour laws, high-quality jobs in workers’ early career, and efforts to reduce informality (OECD, 2015b).

The *OECD Quality Framework* (OECD, 2014) consists of three dimensions: earnings quality, labour market security, and the quality of the working environment. The OECD analysis of job quality in developing countries makes two adjustments in order to better adapt to the labour market of developing economies. First, the dimension of labour market security is complemented by the risk measure of "falling below a subsistence level of earning while employed" (OECD, 2015b: 212); this is because the open unemployment in developing economies is often low, due to the fact that inadequate social security (e.g. unemployment protection) means that workers cannot afford to be unemployed. Second, the quality of the working environment dimension is represented only by "very long working hours", given the scarcity of relevant data in developing economies and an unclear division between formal and informal jobs (OECD, 2015b: 212).

The analysis summarises common features of developing economies in terms of job quality, as well as cross-country differences in each dimension. According to the OECD, the main issue for developing economies is the lack of high-quality jobs rather than the lack of jobs, as open unemployment is relatively low. This partly indicates the insufficient social security, which leads to workers having subsistence-level jobs. From the perspective of earnings quality, the level is commonly lower among developing economies than in OECD countries, due to reasons of wide gaps in average earnings and a high level of inequality. Among the countries investigated, India and South Africa have the lowest earnings quality,[4] while Chile and the Russian Federation have the highest level. In terms of labour market security, the risk of receiving extremely low pay while employed becomes a second

[4] Earnings quality refers to the level of earnings and their distribution (OECD, 2014).

significant source of insecurity, with Indonesia (33% risk rate) and India (25% risk rate) being at the top, in addition to high unemployment. Thus, the overall labour market insecurity in developing economies is higher than that in developed countries. With regard to the quality of the working environment, its level is also lower in developing economies, which is marked by very long working hours in most of the countries considered (OECD, 2015b).

In terms of the socio-demographic characteristics, the OECD concludes that poor-quality jobs are common among young people, low-skilled workers, women workers, and informal job workers (OECD, 2015b). By analysing workers' movement associated with informal jobs in four countries (urban China, urban Colombia, South Africa and Turkey) where data are available, it is found that in spite of the high mobility rates in and out of informality, most workers move out from informal jobs into unemployment and inactivity, rather than into formal jobs; this challenges the hypothesis that "informality constitutes a reliable stepping stone towards better jobs" (OECD, 2015b: 213). Moreover, the cases of urban China and urban Colombia indicate the fact that some workers may be trapped in the vicious cycle between informal jobs and "non-standard (lower-quality) formal jobs", in which informal workers moving to formal jobs tend to be temporary, with a high possibility of falling back into informality (OECD, 2015b: 213). Therefore, the OECD states that people starting careers with informal jobs may lead to negative outcomes in the future labour market (OECD, 2015b).

Based on the above findings, in order to promote the job quality in developing economies, the OECD offers three suggestions. First, policy makers are recommended to give high priority to job quality, paying special attention to the development of sufficient and effective social protection systems (e.g. unemployment compensation, social assistance programmes such as cash transfers, and healthcare benefits) and labour laws. It is important to consider the balance between workers' protection and work incentives (with a preference for formal jobs over informal employment) when designing social protection systems. Due to the context features of informality and weak enforcement in developing economies, the effectiveness of labour laws in workers' protection (e.g. working-time regulations, health and safety legislation, employment protection legislation) is therefore critical. The second key point in policy is to help workers to get high-quality jobs in their early careers, in order to avoid undesirable career prospects. There are diverse policy interventions, including "a strengthened academic and vocational education, quality training and apprenticeship programmes, as well as carefully designed active labour market programmes" (OECD, 2015b: 214). Third, policy should focus on reducing informality through a comprehensive approach. This consists of actions in three aspects: "increasing the benefits of formality, decreasing the costs of formalisation and improving enforcement methods" (OECD, 2015b: 214).

4.1.1.2 EU job quality policy

The EU has introduced measures to improve quality in work and employment (QWE) in its policy agenda since the European Council of March 2000, when the Lisbon Strategy was launched. This policy aims at creating "more and better jobs"; it was followed by the Stockholm European Council and the Laeken European Council in 2001, which set QWE as a general horizontal objective in the Employment Guidelines and adopted various indicators to monitor QWE respectively. Although the unsatisfying evaluation of the European Employment Strategy (EES) in 2003, as well as the increase in unemployment and the deterioration of social democratic parties' leadership in member states in the 2000s, have weakened the implementation of QWE, it nevertheless still remains to be one of the major pillars of the EES (Peña-Casas, 2009). More recently, the notion of job quality has been raised again, in association with work-life balance in Europe (Drobnic and Guillén, 2011). Though the EU used to focus on more jobs rather than on better jobs during the 1980s and 1990s (Drobnic and Guillén, 2011), it now believes that both aims can work together without contradiction (European Commission, 2012). A positive relation between job quantity and quality can function through different channels, such as improved education and workers' security; this has been validated by empirical research results which indicate the positive and significant correlation between employment rates and job quality (European Commission, 2012).

In its *2001 Communication*, the European Commission identifies key policy objectives and policy instruments, as well as measuring indicators for QWE. Peña-Casas (2009) made a summary of this document (see Appendix 5) and classified the elements of QWE into two broad categories, namely the job characteristics, and the work and wider labour market context. The former consists of "objective and intrinsic characteristics including: job satisfaction, remuneration, non-pay rewards, working time, skills and training and prospects for career advancement, job content, match between jobs characteristics and worker characteristics". The latter is made up of "gender equality, health and safety, flexibility and security, access to jobs, work-life balance, social dialogue and worker involvement, diversity and non-discrimination" (Peña-Casas, 2009: 12; European Commission, 2001). Compared with the OECD's job quality policy for developing economies, which focuses on social protection systems, high-quality jobs in workers' early career and the reduction of informality, the EU policy has a much broader focus, ranging from various workers' treatment (e.g. learning and development, equality, flexibility and security) to workers' involvement in organisations and society (e.g. access to the labour market, work organisations and work-life balance, social dialogue and worker involvement).

Despite the progress made to improve job quality, a series of problems still exist: for example, 20% of workers remain in poor-quality jobs; increased job insecurity and intensity resulted from the economic crisis; and there is a lack of attention to psychosocial risks (Eurofound, 2016). In order to tackle these problems, the Eurofound is seeking to provide the information needed by Europe's decision-makers concerning work-life balance, older workers' longer tenure, physical and psychological violence in the workplace, and employees' involvement in decision-making. Efforts are made to achieve equal treatment of men and women in the workplace, to limit working hours, to guarantee safety with standards, and to promote investment in skills development (Eurofound, 2016).

To summarise, the EU policy stresses various aspects of job quality, ranging from working conditions to workers' involvement in organisations and society. By promoting "more and better jobs" in EU countries, it believes that there is no trade-off between employment and job quality.

4.1.1.3 UN job quality policy

Founded in 1945, the United Nations (UN) currently has 193 member states. It is an intergovernmental organisation dealing with issues of humanity that involve peace and security, climate change, sustainable development, human rights, disarmament, terrorism, humanitarian and health emergencies, gender quality, governance and food production (UN, 2016).

The International Labour Organization (ILO) is an agency of the UN which specialises in strengthening job quality in different aspects, such as supporting rights at work, promoting decent employment, and enhancing social protection and dialogue on work-related issues (ILO, 2016a).

As noted by the ILO (2016b), there has been a trend of increased urgency among international policy-makers, especially in the wake of the economic and financial crisis of 2008, to offer high-quality jobs with social protection and respect for rights at work, in order to realise sustainable and inclusive economic development and to eliminate poverty. “Decent work” is regarded as one of the key elements in the ILO’s strategy for sharing the benefits of globalisation among a variety of stakeholders (ILO, 2008; Frenkel and Sydow, 2011). It is defined as work with productivity, fair income, workplace security and social protection, which provides workers with opportunities for personal development and social integration, as well as freedom to comment and be involved in the decisions that affect them (ILO, 2016b).

According to the ILO (2014), developed countries that made a great investment in high-quality jobs over the past decade achieved more progress in living standards, as measured by the growth in average annual per capita income, than developing economies which place less emphasis on job quality. However, the disparity in job quality remains significant. In most developing countries, where more than half of the workers are in informal employment, employment and social challenges remain acute. Those informal workers are less likely to access formal working arrangements, such as pensions, healthcare and regular earnings. As also mentioned by the OECD, such workers tend to be trapped in a worsening work condition with low levels of productivity and pay, thus limiting their potential for further development (ILO, 2014).

In order to overcome the obstacles stated above, it is stressed that sustained development can be achieved through progress in the employment and decent work agenda, together with policies and institutions that help create more and better jobs. Productive employment and decent work are regarded as key elements for the realisation of fair globalisation and poverty reduction. The decent work agenda has been developed by the ILO for the work community, in order to promote job creation, rights at work, social protection and social dialogue, and gender equality (ILO, 2016b). As concluded by the ILO (2014), jobs, rights, social protection and dialogue are integral components of development, in addition to their impact on economic growth. Consequently, employment and decent work are suggested as being a central goal in the post-2015 development agenda. According to the UN's policies (ILO, 2014), it is essential, first and foremost, to promote a diversified productive capacity rather than liberalising trade only. This requires "a strategy to diversify the economic base and enhance the ability of sustainable enterprises to create quality jobs" (ILO, 2014: 5). The labour and social protection institutions are key ingredients of economic growth, high-quality jobs and human development, because they help reduce the incidence of poverty, inequalities and vulnerable employment. However, the effective implementation of such institutions is still a serious challenge for many developing countries, where properly designed wage-setting mechanisms and labour regulations are required. Also, an efficient funding base for social protection is important (ILO, 2014).

Consequently, the policies from the UN indicate that decent work (or high-quality jobs) is essential and significant, not only for the well-being of working people, but also for aspects such as better and more inclusive growth, more equity, more rights, less poverty, and more stable development in economics, enterprises, workplaces, and the whole society (ILO, 2016c). Similar to the OECD's recommendations, the effective implementation of labour and social protection institutions, coupled with proper wage-setting mechanisms, labour regulations and an efficient funding base, are believed to be important for developing countries that have lower-quality jobs.

4.1.2 Job quality policy in China

Unlike the OECD, the EU and the UN, which have clear policies on job quality, currently there is no formal policy for job quality in China. Indeed, the concept of job quality is still new in China, as for quite a long period, the Chinese economy was characterised by the labour-intensive industries with low labour costs; this was reflected in long working hours and low labour wages, which had a negative impact on the working conditions of Chinese employees. Simultaneously, due to overpopulation, working people faced fierce competition in the labour market, resulting in high demand for productivity but a lack of consideration for working conditions. At that time, employment, rather than job quality, was the focus of policy.

However, more policies have been emerging in recent years that implicitly cover some aspects of job quality. Although no existing studies have investigated the driving force of the growing importance of job quality in China, it is likely that China's economic transformation and ageing population constitute two main reasons for the context that requires better-quality jobs, especially in terms of improved wages, training opportunities and workers' representation. For example, the improvements of products and services, as well as in the operational process, marketing and organisational structure, have become more important during the economic transition. Such improvement requires and encourages employees to receive more knowledge and training, thus promoting job quality through improved opportunities for employee training and development. As China no longer competes with low labour costs, higher job quality with various benefits will be encouraged further. Therefore, there will be an increasing need for policies on job quality in China.

Frenkel and Sydow (2011) identify recent institutional changes in China's labour market which relate to the building of decent work or high-quality jobs; these fall into five main categories. First, laws and policies are made to encourage the negotiation of fair contracts between management and employees. For instance, the 2007 Labour Contract Law requires written contracts between management and individual employees, while encouraging longer-term contracts. It fosters collective bargaining at company level by referring to collective contracts formed by management-union interaction. Moreover, it restricts part-time work, outsourcing and overtime, as well as the use of bonds and fines by employers (Cooney, 2007; Lee, 2009). Second, changes in trade union law and government policy aim at enabling the All China Federation of Trade Union (ACFTU) to better represent its members. Third, tripartite bodies at several levels are created to identify and pre-empt emerging conflicts. Fourth, conciliation and arbitration machinery are developed to resolve individual and collective industrial disputes. Fifth, vocational training is becoming available to migrant workers, as well as being more popular with employers as a source of skilled labour. Such emphasis on qualification can help employees to seek and access more satisfying work that allows potential development (Frenkel and Sydow, 2011).

The "proactive employment policy" adopted by the Chinese government consists of policies in various aspects, such as macroeconomic policies;

fiscal, taxation and financial policies; social security policies; and initiatives that include the establishment and improvement of a national vocational training system (Di, 2006: 4). Besides policies and initiatives that secure and promote employment, attention has also been paid to the improvement of job quality, mainly in terms of training. For example, special funds are set up by both central and local government to support and help urban and rural workers to receive proper training.[5] Since 2002, the Chinese government has carried out a widespread campaign to enhance skills, through various initiatives such as the Plan for Strengthening Vocational Training to Improve Employment Qualifications, National Project for Training Highly Skilled Personnel, and a programme for training 500,000 new technicians in three years (Di, 2006). In addition to providing the necessary types of skills and knowledge, a sophisticated education system is believed to develop curiosity and creativity, rather than the mere pursuit of certificates. A greater focus on quality at all levels is regarded as more beneficial for accumulating the skills needed by the rapidly transforming economy and ageing society (Molnar and Koen, 2015).

In comparison with the OECD, EU and UN, the policy concerning job quality in China is less systematic. While the aforementioned policies identify job quality clearly, the concept of job quality in China is still undeveloped, and is less widespread than that in advanced economies. Nevertheless, as China is moving towards a knowledge-based economy in which aspects of job quality are emerging as issues, instead of still relying on low labour costs as a comparative advantage, there has been an emergence of various policies (e.g. social security policies), regulations (e.g. increased minimum wages) and initiatives (e.g. projects and programmes for employee training) related

[5] The vocational qualification training system in China covers five levels: elementary, intermediate, and advanced-grade skilled workers, as well as technicians and senior technicians; it is an important part of the lifelong learning system for employees.

to different aspects of job quality; this indicates a growing concern for job quality in China.

4.1.3 Summary

The following table summarises the main policy focus among different organisations and in China. As noted earlier, the OECD, EU and UN have formal policies of job quality, while China does not. However, China has emerging policy that implicitly covers some aspects of job quality, such as vocational training, fairness and workers' representation. While the OECD and UN pay special attention to the job quality in developing countries and suggest the importance of a social protection system and labour law, high-quality jobs early in one's career, and a reduction of informality, the EU gives a more detailed and broader description of job quality; it has a "more and better jobs" policy, believing that both employment and job quality can work together.

Table 4.1 Main policy focus of OECD, EU, UN and China in terms of job quality

Aspects of job quality policies	**OECD**	**EU**	**UN**	**China**
Wage and non-wage benefits	x	x	x	x
Job security, social protection and labour laws	x	x	x	x
Working hours and work-life balance	x	x	x	
Lifelong learning and career development	x	x	x	x
Health and safety at work	x	x	x	
Workers' involvement and social dialogue	x	x	x	x
Equality at work	x	x	x	

Author's summary of relevant policies.

In terms of China, there is currently no model of job quality; indeed, the concept of job quality is absent in China. But there are increasing numbers of policies relating to some aspects of job quality in China, as awareness of the need to provide high-quality jobs is increasing. With China's transformation into a knowledge-based economy, which requires high added-value and better performance rather than competition on price, it is essential to promote job quality, as this can provide employees with improved conditions for doing better work. Also, the fact of the ageing population to some extent increases the need for high-quality jobs in China.

In conclusion, as the OECD and UN are focusing on developing countries, their policies may be more relevant and helpful to this study, based on the context of China being a developing country. However, it should be noted that the EU and China are similar in that they follow the same path, from job-creation oriented policy to that which promotes both job quantity and quality. Therefore, the EU, mostly contains developed countries, can also be a reference for China in improving its job quality.

4.2 Theories of job quality

The previous section discussed the job quality policy in the OECD, EU, UN and China, and concluded that job quality is important not only for economic performance, but also for the working people and society, through reducing poverty. The popularity of job quality in the policy arena raises the question of what job quality is; however, the meaning of the term is not clear. Therefore, this section explores the definition and measurement of job quality, which are important for the job quality model resigned later in this research.

So far, there has been no grand theory of job quality, but only individual theories which are disciplinary-based. Although generating a theory of job quality is still a task to be undertaken, numerous researchers have tried to measure job quality in different ways. Therefore, this section focuses on the definition and measures of job quality. As noted by Sen Gupta et al. (2009), it is difficult to define and measure job quality. Although there are various definitions, measures and even indexes of job quality, a consensus about what constitutes job quality is lacking (Findlay et al., 2013). Hence, starting from the definition of job quality, this section then moves to the measurement of job quality.

4.2.1 Defining job quality

It is not easy to define job quality in a single term, because scholars from different disciplines tend to focus on different aspects of job quality. Therefore, the definition of job quality in academia varies among different disciplines. For example, economists generally focus on pay (e.g. Clark, 2005), sociologists emphasise skill and autonomy (e.g. Gallie, 2007), and psychologists stress job satisfaction (e.g. Holman, 2010) (Findlay et al., 2013; Knox and Warhurst, 2015). Even within the same discipline, there are variations on the emphasised aspects of job quality. For instance, Hurley et al. (2012) give a brief summary of the main strands of sociological research on job quality, showing the distinctive research focuses on job quality among different traditions. While the traditional sociological approach normally refers to the alienation and intrinsic quality of work, the work-life balance studies approach tends to focus more on working time and intensity, among other features of job quality. The following paragraphs present distinctive theories from different academic disciplines that contribute to the understanding of job quality.

In economics, Bryan and Rafferty (2015) outline two broad approaches to work and labour: one recognises the uniqueness of labour being different from a commodity, as the former includes working conditions (qualitative attributes of work) and the prices paid for labour (the quantitative dimensions, i.e. wages); this approach believes that work is a complex socially embedded and constitutive process. The other approach understands labour as a commodity (or form of capital) that can conform to the normal methods of economic pricing theory,[6] especially when the differential qualities of a workplace and quantities of a worker's marginal productivity (income-earning capacity) are considered. Human capital theory (HCT), as the leading expression of labour and work, has been the dominant mode of economic analysis. In a paradigm of maximising the behaviour of agents and equilibrium conditions, HCT regards labour as a factor being paid in terms of its marginal productivity. In this respect, Bryan and Rafferty (2015) note that job quality not only has to be quantified, but its connection to labour productivity must be verified. Moreover, another theory, known as "compensating wage differentials" (CWD), has been introduced in economics to explain wage disparities. It states that, "in renting their human capital (labour services) workers negotiate a bundle of monetary and non-monetary amenities/disamenities"; and here job quality enters the bargaining agenda and becomes reflected in wage bargaining (Bryan and Rafferty, 2015: 140). The empirical proposition for the study of job quality, according to the CWD hypothesis, is that workers are fully compensated for the utility and disutility or risks they experience at work. This theory, however, lacks robust support from empirical testing, and is challenged by studies such as those by Muñoz-de-Bustillo et al. (2012), Kreuger and Summers (1988), and Fernandez and Nordman (2009); these

[6] According to Bryan and Rafferty (2015: 140): "in the logic of price theory, all the different qualities of work are translated into different quantities (prices) ... In competitive labour markets, both sets of attributes (marginal productivity and quality) are resolved quantitatively - so that the (equilibrium) price for labour will be the outcome of the supply and demand conditions for both wage and non-wage attributes."

studies find contradictory results that good jobs and good wages may be positively rather than negatively correlated (Bryan and Rafferty, 2015). With regard to CWD theory, Muñoz-de-Bustillo et al. (2011) argue that its prediction would be effective provided that the three assumptions of the theory are satisfied, i.e. a competitive labour market (perfect competition), a high level of worker mobility (full employment) and workers having complete information about the non-pecuniary aspects of their jobs (perfect information). However, these requirements are very stringent and difficult to comply with in reality.

In addition to the orthodox economic approaches mentioned above, other strands in economics, such as the radical approach and behavioural approach provide alternative aspects to be considered. The radical approach, characterised by Marxism, argues that workers in capitalism would always be exploited and would generally have bad jobs with low wages, unless the workers could gain enough economic and political force to fight for the betterment of these conditions. Therefore, from this point of view, improving the low level of non-pecuniary aspects of jobs would be a task for trade unions and political parties; and consequently, defining a good job would be less a technical question, but a political one that reflected the power relations in a society (Muñoz-de-Bustillo et al., 2011). The behavioural approach stresses that workers are not only interested in the absolute levels of their wages, but also their relative income level. Moreover, the Economics of Conformism (Akerlof, 1980; Jones, 1984) points that individual behavior would be affected by group membership, whereby the individual takes into account the rewards and penalties of his or her behavior in accordance or deviance with the internal norms of the group. This approach explains the situation of groups of workers finding themselves locked in an inefficient or “bad” level of working conditions, as a result of past collective decisions and norms affecting various aspects of job quality (procedures, rhythms, intensity, etc.) (Muñoz-de-Bustillo et al., 2011: 50). As a consequence, this approach calls for a definition external to the individual worker, and believes that a worker's capacity to participate in the establishment of those internal-group rules is in itself a dimension of job quality (Solow, 1992; Muñoz-de-Bustillo et al., 2011).

The starting point of the sociological tradition in the study of job quality arises from Karl Marx's concept of alienation, which refers to work as not only a means to an end, as do classical economists, but also as a crucial element of men and women's realisation and fulfillment; this concept emphasises the intrinsic qualities of work as key determinants of workers' well-being. Skills and autonomy are two important aspects involved in the debate among sociologists: on the one hand, Braverman (1974) argues that the de-skilling and reduced autonomy of earlier craft workers resulted from the process of mechanisation and rationalisation of modern industry in the first half of the 20th century; on the other hand, Bell (1973) states that knowledge is the key factor of production, and implies a very significant upskilling, increased autonomy and flattened power structures of the labour force. A skill polarisation has been reflected in new empirical evidence which suggests that both views could have been simultaneously right (Autor et al., 2006). In addition, Blauner (1964) operationalised Marx's concept of alienation with four dimensions that reflect the subjective feelings of the workers themselves, including powerlessness, meaninglessness, social isolation and self-estrangement.

Apart from traditional sociological approach, another three fields of study have emphasised other aspects of job quality. First, the segmentation theory states that instead of a single labour market functioning according to competitive rules of supply and demand, there are different segments functioning with different rules: "the competitive form is only one mode of labour market organisation, coexisting along other modes of organisation" (Peck, 1996: 47). The theory considers segmentation to be the result of a multiplicity of factors, including social reproduction, discrimination, industrial relations systems and state regulation, and provides a sound theoretical framework for understanding the increasingly fragmented labour markets brought by the flexibilisation policies of the 1980s and 1990s across OECD economies (Heery and Salmon, 2000; Muñoz-de-Bustillo et al., 2011). By stressing the link between the conditions and characteristics of work within firms as well as the link between the conditions and characteristics of employment in the labour market, segmentation theories provide a basis for an integrated approach to job quality, highlighting the importance of the work and employment conditions for job quality (Muñnoz de Bustillo et al., 2011). Second, the field of health and safety studies, which originated from occupational medicine and health and safety studies, considers the workplace to be an environment that exposes workers to a number of physical and psychological agents that can make them sick or generate risk of accidents. However, more recent approaches tend to be more integrated and organisational, assigning a central role to the social determinants of health and safety problems, including motivation, decision latitude and equity (Wilkinson, 2001; Muñoz-de-Bustillo et al., 2011). Most health and safety studies are empirical and evaluate the impact of certain conditions of work on workers' health (Muñoz-de-Bustillo et al., 2011). Third, the work-life balance (WLB) has enjoyed a growing popularity in social research especially when (married) women join the labour force in massive numbers; this means that the conflict between the demands of working and non-working life becomes visible, thus making WLB a salient social issue. Although there has been no clear and widely agreed definition of WLB, Kalliath and Brough (2008: 326) propose a general definition: "work-life balance is the individual perception that work and non-work activities are compatible and promote growth in accordance with an individual's current life priorities." Muñoz-de-Bustillo et al. (2011) suggest that assessment of job quality should include information on this increasingly important area of research and social concern.

In psychological studies, instead of assessing the input (characteristics of jobs), scholars focus on the impact of different job characteristics on the well-being of the worker through job satisfaction. This approach takes into account the fact that there are differences in tastes and preferences in relation to what is a good job, but it has limitations in allowing comparative analysis (Muñoz-de-Bustillo et al., 2011).

In addition to what job quality involves, the issue of whether job quality should be defined objectively or subjectively is another difficult question to be answered. On the one hand, the subjective approach regards job quality as the "utility that a worker derives from his or her job" (Eurofound, 2012: 10). Such utility is subjective, as each worker has their own preferences regarding different features of jobs, such as wages, hours and type of work. There is a debate on the measurement used in this approach: some argue that only through actions and behaviours around work can this utility be captured, while others believe that measures of well-being, concerning feelings and emotions or job satisfaction, can be applied in the subjective approach (Eurofound, 2012). On the other hand, the objective approach of defining job quality involves the "features of jobs that meet workers' needs from work", by following theory of what human needs are; and it proceeds to research on how far jobs meet those needs (Eurofound, 2012: 10). For instance, Green (2006) develops the idea that a "good job" provides workers with a high capability to do and be things that they value. The capability to achieve well-being depends on how far jobs enable workers to exercise influence over work and to pursue their personal work-related goals. Although the prioritisation of needs varies among workers, jobs with high quality can allow a full range of needs to be met. Objective approach researchers maintain that only an objective concept of job quality can be defined, in spite of the role of emotional factors. They argue that well-being measures do not necessarily correspond to the satisfaction of needs; and other factors, such as people's expectations and personalities, can also have an impact on well-being and job satisfaction (Eurofound, 2012).

Instead of being absolute defenders of either the objective or subjective approach, a number of researchers have applied a hybrid or multi-discipline approach to defining job quality, incorporating both objective and subjective aspects (Wright, 2015). Wright suggests that a useful distinction be made between research approaches that focus on either "extrinsic" or "intrinsic" aspects of a job. The examples of Clark and Eurofound are given, in order to display approaches that combines both subjective and objective elements, or extrinsic and intrinsic elements of job quality. Clark (2005) indicates that it is valuable to consider job quality from the perspectives of both job value (how much workers care about different job outcomes) and job outcomes; while the Eurofound (2012) presents an approach that mixes both extrinsic (earning and prospects) and intrinsic (skill use and discretion, social environment, physical environment, work intensity and working time quality) elements of job quality.

Despite the controversies mentioned above, it is commonly agreed that job quality is a multidimensional concept (e.g. Muñoz-de-Bustillo et al., 2011; Wright, 2015; Warhurst et al., 2017). Some key dimensions of job quality are generally regarded to be important, concerning aspects of pay, skills, workers' representations and autonomy, job security and flexibility. As noted by Findlay et al. (2013), employees in good-quality jobs are enabled to be qualified for their posts by having improved skills and capabilities for dealing with difficulties and requirements of the work. In terms of tasks and work organisation, high-quality jobs provide opportunities for task discretion and control, as well as allowing individuals to have their voice heard and represented, and to participate in relevant decision-making. Furthermore, the dimensions of pay and job security are important, because they concern mutually beneficial forms of flexibility regarding working hours and demands.

Although job quality is often considered in multiple dimensions, there is hardly any consensus on the exact components of job quality; thus there are diverse versions of multidimensional job quality conceptualisation. For example, Tilly (1997) identifies seven dimensions of job quality: wage, fringe benefits, due process, hour flexibility, permanence, mobility, and control over the work process. Clark (2005), however, relates it to six aspects: pay; hours of work; future prospects; difficulty, stress and risk of job; content, prestige and independence of job; and interpersonal relations. Davione et al. (2008) link employment quality to socio-economic security (e.g. decent wages, secure transitions), skills and training, working conditions, and the ability to combine work and family, as well as the promotion of gender equality. Similarly, Kalleberg (2011) regards job quality as including economic compensation (e.g. earnings and fringe benefits such as health insurance and pensions); job security and career development (opportunities to progress to better jobs); work control (level of control over work activities) and self-fulfilment (regarding jobs as interesting and meaningful); and work-life balance (the extent to which working hours and control over schedule allow time to be spent with family and other non-work activities). From the perspective of industrial psychology, Holman (2013) defines job quality in terms of aspects of work organisation, wages and payment system, security and flexibility, skills and development, and engagement. Antón et al. (2012), in comparison, try to give a more comprehensive definition of job quality, stating that it involves the following dimensions, which correspond to the five main traditions of job quality study: pay, intrinsic characteristics of the job, terms of employment, health and safety, and work-life balance.

In summary, job quality is a multidimensional construct. The general or overall quality of a job is the sum of multiple aspects, influencing both the employment relationship and work itself, that have an impact on workers' well-being (Skalli et al., 2008; Muñoz-de-Bustillo et al., 2011). The variation and difficulties in defining job quality indicate that the measurement of job quality is also not an easy task. Hence, the following part discusses the issue of measuring job quality in academic research.

4.2.2 Measuring job quality

In terms of the measurement of job quality, there are also variations in job quality indicators. For instance, some approaches use a single indicator (e.g. Osterman and Shulman, 2011), while others adopt multiple indicators (e.g. Clark, 2005). And even on the same basis of using multiple indicators, there are still debates on the weighting of each indicator (e.g. Muñoz-de-Bustillo et al., 2011) (Findlay et al., 2013; Knox and Warhurst, 2015). In practice, the use of job quality indicators is also confined by the availability of data, as well as by the policy interest.

As mentioned earlier, there are three main streams in the study of job quality: economics, sociology and psychology. Therefore, the following paragraphs present how the three streams respectively measure job quality. First, a single indicator is often adopted by economists who typically use wage as a proxy measure for job quality (Wright, 2015), but it is usually restricted to purely monitoring criteria, such as real wage increase or the widening of wage distribution (Clark, 2005). The reason for using wage as the main indicator of job quality is that these data are easier to obtain and measure, and wages are generally positively correlated with other working conditions; this leads to a belief that "obtaining a picture of wages over time would not be substantially different from any more detailed picture of overall job quality" (Wright, 2015: 24). This approach, however, is questioned by other researchers. Green (2006), for example, identifies a paradox of improvements in wages and physical working conditions being associated with the deterioration of other aspects of work, such as work effort and job autonomy, and argues that job quality is unclear if pay is increasing while other aspects, such as the amount of effort required, are deteriorating (Green, 2006). Another challenging argument states that wages are not the attribute most valued by workers themselves (e.g. Clark, 2005; Sutherland, 2011). For instance, Clark (2005) finds that among eight job characteristics, employees rate job security, job interest and independence as the features they care most about, rather than income or hours of work. Despite the arguments against using wage as a measure, it should be noted that wage is one of the important attributes of job quality, and is commonly used by economists. Therefore, it is believed that wage should be included as one of the measuring indicators of job quality. Relevant problems caused by using wage as a single indicator can be tackled by introducing other aspects of job quality that are also regarded as important.

Second, unlike the economists, sociologists normally focus on other aspects of job quality, including autonomy, skill, social relations, and present and prospective material rewards of the job (Green, 2006). According to the human capital theory by Becker (1964), different levels of job quality are categorised by skills involved in particular jobs or the "skill matching" between workers and jobs (Davione et al., 2008). Vieira et al. (2005) point out that job quality involves the respective workers' subjective evaluation of different features, based on their characteristics and expectations (Wright, 2015). Researchers also raise the issue of "mismatches" between education obtained and education required, claiming that this can lead to problems related to over-education and unnecessary credentials (Wright, 2015). Moreover, skill mismatch can also lead to lower job satisfaction (Okay-Sommerville and Scholarios, 2013). Therefore, skill is another important aspect of job quality, but also has associated problems that need to be considered.

Third, the psychologists suggest measuring job quality according to job satisfaction. Job quality is found to be linked with reported job satisfaction in a number of studies with traits of the job, such as wages, autonomy, prestige and security being correlated with the degree of contentment workers feel about their work (Jencks et al., 1988; Clark, 1998; Clark, 2005; Handel, 2005; Osterman, 2012). This approach has the advantage of avoiding the difficult process of selecting important attributes of job quality and measuring them (Muñoz-de-Bustillo et al., 2011). However, it is found to have no apparent relevant relation to other objective indicators of job quality (Muñoz-de-Bustillo et al., 2005), which makes it less attractive to include it as an indicator of job quality. It is also questioned whether job satisfaction can capture well-being: as workers assess job satisfaction according to their expectations of the job, there might be inconformity among expectations for different jobs (Green, 2006). Consequently, the indicator of job satisfaction suggested by psychologists has strengths, in terms of reflecting workers' opinion on job quality and allowing easy measurement; but it has major limitations for comparative studies, because workers have different perspectives on job quality.

In addition to the various approaches and indicators adopted by different researchers, there are distinctions in terms of the different levels focused upon (Sengupta et al., 2009). Some researchers build large-scale data sets at the macro level of a whole economy, while others conduct micro analysis at the workplace level in particular industries, occupations and types of employment arrangements (Wright, 2015).

Apart from job quality indicators, existing research also indicates that different factors can affect job quality. For example, Smith and Thompson (1992) note that in the state socialist context, the economic and political arrangements have been accompanied by a kind of "social contract" with the work-force, at least among state employees, in which employment security and other rewards (e.g. subsidised goods and housing) are exchanged for a degree of participation or at least acquiescence in the workplace and in the broader social terrain. Further to their work, Smith and Meiksins (1995) indicate that the particular work organisation practices are influenced by a three-way interaction of "system effects", "societal effects" and "dominance effects", meaning respectively the economic mode of production, the national legacies and institutional patterns, and the "best practice" or universal modernisation strategies, which are formed and diffused by the "society-in-dominance" within the global economy at a particular period of time. Carré and Tilly (2012) state that national institutions influence job outcomes in terms of specific jobs in particular sectors, while sector is an independent determinant of job quality and a mediator of national and corporate influences, plus the role of employer strategies within a set of institutions. Wright (2015) notes the debate regarding the impact of the changing jobs market on the variations in job quality, and the use of institutional theories to understand apparent cross-national differences in job quality found in the literature. Gallie (2007) reviews the quality of working life in seven European countries with different institutional systems, and concludes that an "employment regime"[7] perspective provides the most convincing account of the factors that impact on the quality of work in capitalist systems. Besides, other factors including laws and regulations, work organisations and actors, geographies, and sociological and psychological aspects can affect job quality as well (Warhurst et al., 2012; Frenkel, 2015; Murray and Stewart, 2015; Quinlan and Bohle, 2015; Weller and Campbell, 2015). Consequently, besides the different approaches and techniques to measuring job quality, attention also needs to be paid to the various factors mentioned above when investigating job quality in specific context.

4.2.3 Conclusion

There are diverse definitions and measuring indicators of job quality among academics (see Table 4.2). The contents vary according to different disciplines and research focuses, characterised by economists stressing the wage aspects of job quality, sociologists focusing on skills and autonomy, and psychologists emphasising job satisfaction. Even within the same discipline, the contents are also different due to distinctive research interests. For example, unlike the orthodox economic approach which focuses on wage, the radical economic approach considers industrial democracy, and the behavioural economic approach assesses job quality from the perspective of participation. Similarly, there are also variations in

[7] According to Gallie (2007), there are three principal models of employment regime: inclusive, dualist, and market regimes. While the inclusive regimes refer to policies designed to extend both employment and common employment rights as widely as possible throughout the working-age population, the dualist regimes are less concerned about overall employment levels, and instead guarantee strong rights to a core workforce of skilled long-term employees, at the expenses of poor conditions and low security of the periphery. The market employment regimes stress minimal employment regulation and assume that market adjustments will naturally lead in the long term to relatively high employment levels, while employees' benefits will be strictly related to their marginal productivity.

psychology studies: for instance, industrial psychology tends to stress elements such as work organisation, engagement, security and flexibility, instead of job satisfaction. Although job quality is commonly believed to be a multidimensional concept, there is no consensus on defining and measuring it. There are also distinctions between objective and subjective, or extrinsic and intrinsic approaches, and a corresponding debate on how job quality should be reflected. In terms of the conduct of research, studies variously focus on the macro or the micro level. In short, the definition and measurement of job quality in academia are varied, due to the different research interests and the availability of data.

Table 4.2 Dimensions of job quality suggested by different disciplines

The orthodox economic approach: compensating differentials	*Labour compensation* · Wage
The radical economic approach: exploitation	· Industrial democracy as a compensating power
Behavioural economic approach	· Participation
The traditional sociological approach: alienation and intrinsic quality of work	*Objective strand:* · Skills · Autonomy *Subjective strand:* · Powerfulness · Meaningfulness · Social support · Self-fulfilment
The institutional approach: segmentation and employment quality	· Contractual status and stability of employment · Opportunities for skills development and career progression
Occupational medicine and health and safety literature: risks and impact of work on health	*Working conditions:* · Physical risks · Psychosocial risks *Working outcomes:* · Perceived impact of work on health · Absenteeism
Work-life balance studies	*Working time:* · Duration · Scheduling · Flexibility · Regularity · Clear boundaries *Intensity:* · Pace of work and workload · Stress and exhaustion

Industrial democracy and participation	*Voice:* · Union membership · Collective bargaining coverage
Psychological studies	· Job satisfaction
Industrial psychology	· Work organisation · Security and flexibility · Engagement

Sources: Muñoz-de-Bustillo et al., 2011: 60; Hurley et al., 2012: 157.

4.3 The author's model of job quality

After reviewing different theories of job quality in previous part, this section aims to build the author's own model of job quality. In order to generate the model, it is helpful to review various existing models of job quality, and to consider issues such as measurement problems and sources of data available in China. Therefore, first by referring to different models of job quality from the OECD, EU and UN, an ideal model is initially constructed. Then, a practical model of job quality is generated in consideration of the availability of particular indicators.

4.3.1 Review of existing models

In the process of building the model and designing indicators of job quality, it is important to consider relevant conceptual and technical problems that need to be tackled. Muñoz-de-Bustillo et al. (2011) raise some issues regarding several aspects. First, if the purpose is to measure job quality, it is better to measure the outcomes of job quality (e.g. the actual levels of employment security and autonomy) rather than its procedures (e.g. channels for workers' participation in deciding their own working conditions, safety standards, health and safety information). However, the job procedure approach can be a second solution if reliable information about the outputs is lacking; but from the perspective of results, this procedure should be justified as a satisfying job attribute in itself. Second, by giving an example of a worker moving to a higher-quality job but with no changes to the quality of the existing jobs, it is believed that emphasis should be placed on the static dimensions of jobs rather than dynamic ones. Third, in terms of research at individual or aggregate level, there is no difference between them if the aim is to compare overall job quality across countries, regions or sectors; this is because research at the individual level needs to compare country averages, and research at the aggregate level is also based on averages or summaries. Finally, there are two ways to simplify the complex and multidimensional reality of job quality for better understanding: either creating a composite index or a system of indicators. Both of the approaches require a theoretical model that clearly defines the structures of dimensions and measurements, but the composite index goes one step further, by standardising and weighting each element. According to Muñoz-de-Bustillo et al. (2011), the composite index can be very useful for policy evaluation and design, and can have a bigger impact than a system of indicators, because it is less ambiguous. Nevertheless, there are difficulties in weighting different elements; and if it is not well structured, the composite index will lead to wrong conclusions. Therefore, both high scientific standards and an explicit definition of the desired conditions of work and employment are required (Muñoz-de-Bustillo et al., 2011).

The job quality models from the OECD, EU and UN are major and influential among various existing models. Therefore, the following part focuses on these three models, and compares them.

4.3.1.1 OECD model of job quality

The OECD model of job quality is based on a framework constituted by three dimensions: earnings quality, labour market security, and quality of the working environment. The approach taken by the OECD is based on outcomes (e.g. job security) instead of drivers of job quality (e.g. employment protection regulations). It focuses on individual workers, in the sense that all indicators are defined at the level of individuals. This approach favours objective features of job quality in order to ensure better comparability across countries and over time (OECD, 2014). Table 4.3 presents the OECD's approach to measuring job quality.

Table 4.3 The OECD model of job quality

Dimension	**Aggregate outcome measure of job quality**	**Subcomponents (at the individual level)**
Earnings quality	Earnings index taking into account both earnings level and its distribution (inequality).	*Level of earnings*.
Labour market security	Expected earnings loss associated with unemployment.	*Unemployment risk*: Risk of becoming unemployed; Expected duration of unemployment. *Insurance against unemployment risk*: Eligibility for unemployment benefits; Generosity of benefits (replacement rates).
Quality of the working environment	Proportion of workers experiencing job strain (i.e. imbalance between work stressors and workplace resources).	*Work-related stress factors*: Time pressure at work; Exposure to physical health risk factors; Workplace intimidation. *Support and resources to accomplish job duties*: Work autonomy and learning opportunities; Good management practices; Good workplace relationships.

Source: OECD, 2014: 87.

4.3.1.2 EU model of job quality

Compared with the OECD, the EU's approach (see Table 4.4) takes both objective measures and subjective measures into consideration; it presents a multidimensional concept of job quality with a wider scope, from dynamic perspectives, including the labour market, pay transitions, gender and work-life balance. However, this approach excludes some indicators such as wages, work intensity, and some more qualitative aspects of human capital information that are regarded as relevant and important to job quality (European Commission, 2009). Also, as based on country-wide indicators, this approach is not directly related to the characteristics of particular jobs and only provides information on the socio-economic context. This is different from the OECD indicators which apply the individual's level.

Table 4.4 The EU model of job quality

Dimension	**Indicator**
1) Intrinsic job quality	Transitions between non-employment and employment and, within employment, by pay level; Transitions between non-employment and employment and, within employment, by type of contract; Satisfaction with type of work in present job.
2) Lifelong learning and career development	Percentage of the working-age population participating in education and training by gender, age group, employment status and education level; Percentage of the labour force using computers in work, with or without specific training.
3) Gender equality	Ratio of women's gross hourly earnings to men's for paid employees at work; Employment rate gap between men and women; Unemployment rate gap between men and women; Gender segregation in occupations;[1] Gender segregation in sectors.[2]
4) Health and safety at work	The evolution of the incidence rate.[3]
5) Flexibility and security	Number of employees working part-time and with

	fixed-term contracts as a percentage of the total number of employees.
6) Inclusion and access to the labour market	Transitions between employment, unemployment and inactivity; Transitions between non-employment and employment or training; Total employment rate, and by age group and education level; Total long-term unemployment rate, and by gender; Percentage of early-school-leavers;[4] Youth unemployment ratio.[5]
7) Work organisation and the work–life balance	Difference in employment rates for individuals aged 20 to 50 in households having or not a child aged between 0 and 6 years; Children cared for (other than by the family) as a proportion of all children in the same age group; Employees who left their job over the last year for family duties and intend to go back to work but are currently unavailable for work.
8) Social dialogue and workers' involvement	No agreement.
9) Diversity and non-discrimination	Employment rate gap for workers aged 55–64 years old; Employment and unemployment rate gaps for ethnic minorities and immigrants.
10) Overall economic performance and productivity	Growth in labour productivity (both per hour worked and per person employed); Total output (both per hour worked and per person employed); Percentage of the population having achieved at least upper secondary education by gender, age group and employment status.

Source: European Commission, 2009: 153.

Notes: (1) The occupational segregation index is calculated as: i = where M, total male employment; Mi, the number of males in occupation i; F, the total female employment; and Fi,the number of females in occupation i. The index varies between 0 and 1. A higher index means more segregation in the distribution of occupations by gender (Emerek et al., 2003). (2) The segregation-by-sector index is calculated as in the previous footnote, but using economic sector instead of occupation. (3) Defined as the number of accidents at work per 100,000 persons in employment. (4) Percentage of 18–24 year-olds having achieved lower secondary education or less and not attending further education or training. (5) Unemployed aged 15–24 as a percentage of total population in the same age bracket.

4.3.1.3 UN model of job quality

In accordance with its theory of job quality, the UN adopts a model with seven dimensions of job quality. This model is more comprehensive than the OECD and EU, because it includes elements that are not considered by the aforementioned models. For example, fair treatment and work-life balance indicators are lacking in the OECD model; and the EU model does not include pay, an indicator often regarded to be important. However, unlike the EU model's inclusion of ten dimensions in total, the UN model is presented in a brief way. Both the objective approach and subjective approach to measuring quality of employment are involved. Accordingly, the UN model of job quality (see Table 4.5) is an important one for reference. Thus, the following part conducts an in-depth review of each indicator in the model.

Table 4.5 The UN model of quality of employment

Dimension	**Indicator**
1) Safety and ethics of employment	Safety at work; Child labour and forced labour; Fair treatment in employment.
2) Income and benefits from employment	Income; Non-wage pecuniary benefits.
3) Working hours and balancing work and non-working life	Working hours; Working time arrangements; Balancing work and non-working life.
4) Security of employment and social protection	Security of employment; Social protection.
5) Social dialogue	Freedom association; Right to organise and bargain collectively.
6) Skill development and training	Degree to which workers are trained; Qualification for work.
7) Workplace relationships and work motivation	Workplace relationships; Work motivation.

Source: United Nations, 2010: 4.

According to the UN (2010), first, the dimension of the “safety and ethics of employment” involves general information on workplace injuries and deaths, and unacceptable forms of labour. Second, the “income and benefits from employment” dimension refers not only to the income and earnings, including compensation (e.g. wage and salary, bonus, commission, gratuity, remuneration income in kind, taxable allowance, retroactive wage payment and stock options) and income from self-employment, but also to the benefits an employee might get, such as leave and health coverage. Third, the dimension of “working hours and balancing work and non-working life” indicates the importance of time issues in work, in terms of the impact on human well-being and the balance between work and non-working life. Special attention has been paid to the number of hours (including excessively long or involuntary short hours of work), timing and work schedules (whether they are compatible and convenient, regular and consistent, as well as easy to choose). Fourth, the “security of employment and social protection” dimension raises another important aspect relating to the quality of employment, which many employees are also highly concerned about. On the one hand, security of employment includes information on permanence degree and work tenure, employment status, and employment informalisation; or in short, the “flexicurity”, i.e. “a portmanteau of flexibility and security” (United Nations, 2010: 7). On the other hand, social protection mainly consists of employment insurance (called “unemployment insurance” in some countries) coverage, pension coverage, and paid leave for maternity or parental leaves. Fifth, the “social dialogue” dimension refers to “all types of negotiation, consultation and simple exchange of information between representatives of governments, employers and workers, on issues of common interest relating to economic and social policy” (United Nations, 2010: 7). Sixth, with regard to “skill development and training”, the degree of training and whether employees are under- or over-qualified for their work are two key aspects, as a job may offer employees opportunities for training as well as professional or personal development. It is noted that skills are not just a function of the abilities and training of employees, but also reflect the nature of a job where skills cannot be developed when the worker is over-qualified for the position. Finally, the “workplace relationships and work motivation” constitute an essential element of the quality of employment, due to their positive roles in improving work satisfaction and performance, promoting morale, and reducing turnover and absenteeism. Workplace relationships concern the social characteristics of work (e.g. inter-employee dialogue, communications between employees and their supervisors), while work motivation involves the more individual motivational characteristics (e.g. valuable goals, competence, autonomy, and sufficient feedback from the work) (United Nations, 2010).

In summary, the OECD model of job quality is founded on the basic attributes of job quality, while the EU model captures more aspects of job quality in a more detailed way. The UN model, in comparison, is more clearly integrated. Furthermore, as China is one of the charter members of the UN, the UN’s model is more suitable for China. Therefore, the UN model is regarded as the most appropriate reference for building the author’s own job quality model in this research, due to the model’s comparative advantages and its relevance to the context in which it will be applied.

4.3.2 Building the author’s model of job quality

The review of major existing models from the OECD, EU and UN, as well as exploring the theoretical understanding of job quality among different academic disciplines, leads to a conclusion that job quality is a multidimensional construct. Moreover, instead of using one single indicator, multiple indicators are commonly applied in a job quality model. Although a single indicator is easy to measure and study, it is not enough to fully represent the condition of job quality. Therefore, this research adopts an approach that combines indicators suggested by different disciplines, in order to build a model that can better reflect job quality both as a whole and in separate aspects. In addition, it is important to consider the availability of data in China. At present, there is no survey available on job quality in China; hence, the data can only be gathered through public statistical yearbooks or private surveys. In the following part, an ideal model of job quality is generated, including dimensions and indicators. Then, in consideration of the data available in China, a conclusion is made on the final choice of model for this research, especially in terms of particular indicators adopted.

Based on the key points mentioned by Muñoz-de-Bustillo et al. (2011) regarding conceptual and technical issues in building a model, the ideal model for this research is developed from existing policy models and scientific models, designed to include indicators regarding different important aspects of job quality, at both individual and aggregate levels. They are grouped into five categories as essential dimensions of job quality: earnings and benefits from job; working hours and work-life balance; safety, security and equality; skills and development; autonomy and social dialogue. In the model, eleven ideal indicators of job quality are included, provided that relevant data are available. The model is presented as a system of indicators instead of a composite index, because this can better reflect job quality in each aspect, and the model can be aggregated further into an index by giving weights to indicators and dimensions.

In terms of obtaining data in China, the most important source is the *China Labour Statistical Yearbook*, which contains data relating to key aspects of job quality, such as wages, working hours, work safety and workplace training. In addition, as this research will be conducted in Shanghai, the *Shanghai Statistical Yearbook* is another relevant source of data on job quality. Table 4.6 shows the data available in detail, and compares them with the ideal model built. In general, most of the indicators' data are available in China except those of working time arrangements and work-life balance. Therefore, this research can apply the ideal model with the dimension of working hours and work-life balance, using weekly working hours as the indicator.

Table 4.6 The ideal model of job quality and its data availability in China

The ideal model: Multidimensional job quality		**Data available in China**	**Year of latest data**
Dimensions	**Indicators**		
Earnings and benefits from job	1. Wage	Average wage (by region and industry)	2014
	2. Non-wage pecuniary benefits	Pension insurance; basic medical insurance; maternity insurance	2013
Working hours and work-life balance	3. Working hours	Weekly working hours (by age, occupation, gender, educational attainment, and industry)	
	4. Working time arrangements	Statistical data not available	
	5. Balancing work and non-working life		
Safety, security and equality	6. Safety at work	Work injury insurance; work injury certification	2013
	7. Security of work, e.g. access to labour market, social protection	Employment rate; unemployment rate; unemployment insurance; labour and social security inspection; social insurance funds	

	8. Fair treatment and equality	Employment rate gap between men and women; unemployment rate gap between men and women	
Skills and development	9. Degree of training	Number of employment training centres, teachers and staff, trainees and graduates; training funds	
	10. Qualification for work	Educational attainment (by gender, age, industry and occupation); occupational skill testing	
Autonomy and social dialogue	11. Right to organise and bargain collectively	Labour disputes accepted and settled (by region)	

According to the ideal model and data available in China, the designed model of job quality contains nine indicators. First, the dimension of "earnings and benefits from job" is derived from the economic concept of job quality. In this dimension, the indicator of wage is based on average wage, and the non-wage pecuniary benefits indicator is measured by pension insurance, basic medical insurance and maternity insurance. In the second dimension of "working hours and work-life balance", the only indicator of working hours is presented by weekly working hours, due to the limitation in data availability. Third, the "safety, security and equality" dimension covers indicators of work safety, security and equality; these are mainly acquired from data of work injury insurance (for the work safety indicator); employment rate, unemployment insurance and social insurance funds (for security); and employment rate gap between men and women respectively (for equality). The last two dimensions are commonly suggested by social researchers. On the one hand, the dimension of "skills and development" deals with the degree of training and qualification for work. The former is measured by number of training centres, teaching staff, trainees, training funds and training funds, while the latter is represented by educational attainment and occupational skill testing. On the other hand, the "autonomy and social dialogue" dimension examines employees' right to organise and bargain collectively, according to data for labour disputes accepted and settled.

In summary, based on the understanding of job quality and the availability of data in China, the author's model of job quality is designed to be a multidimensional model consisting of five dimensions. The nine indicators in the model represent different aspects of job quality, and constitute a system of indicators that is suitable for both individual- and aggregate- level analyses in China.

4.4 Conclusion

This chapter has discussed job quality from the perspective of policy and theory, and has enabled the construction of the author's own model of job quality based on a review of various existing models. Firstly, job quality has become an important issue commonly stressed in the policy arena of key international organisations, including the OECD, EU and UN. Although China currently lacks any formal job quality policy, it increasingly has some policies and laws that implicitly favour the improvement of job quality in some aspects. It should be noted that the popularity of job quality policy has broadly focused attention on the quality of jobs, instead of the quantity of jobs, which has been the focus of employment policy for a long period. The latest policies from the OECD and UN both emphasise improving job quality in developing countries, where the job conditions are worse than in developed ones. In this context, the policies suggest the importance of a social protection system and labour law, high-quality jobs early in one's career, and the reduction of informality. As China is also a developing country, the job quality policies from the OECD and UN can be a valuable reference for this research in China.

In comparison, the EU, which includes many countries in Europe, has changed from a policy that was previously oriented towards job creation, to the current “more and better jobs” policy. It encourages European countries to promote both employment and job quality through working together. A more detailed and comprehensive description of job quality policy is given, ranging from objective and intrinsic job characteristics to the context of work and the wider labour market. Although the EU job quality policy is designed for European countries which are mostly developed economies, it can still be worth exploring, as China has been experiencing the same transition: from a policy that only aimed for higher employment, to one that stresses both job quantity and quality. This similarity between European countries and China may exist because China is undergoing a similar economic development stage to that which Europe underwent before: from intensive industrialisation to economic restructuring, in which a knowledge-based economy and high value-added products and services are emphasised. During the period of industrialisation, job creation is often exaggerated; this is sometimes with the cost of significantly reduced job quality, as the governments believe that more job positions bring more productivity, thereby increasing economic performance. However, while the economic structure is being optimised, it is insufficient to merely pursue a high employment rate, as it must be supplemented with policy oriented towards job quality. Because higher job quality provides employees with opportunities such as better training, more autonomy, attractive wages and balanced working time, it offers an environment favourable for creating higher value-added output and new ideas that may lead to innovation. Therefore, the “more and better jobs” policy from the EU is also an important guideline for China in this research.

Despite the absence of a concept of job quality in China, or a formal job quality policy, there is a growing concern about job quality, as ever more and more policies and regulations have been issued which implicitly cover some aspects of job quality such as wages, training opportunities and workers' representation. The economic transformation and the ageing population indicate a potential demand for improving job quality in China. Therefore, job quality will become important for China in the near future.

No grand theory regarding job quality has emerged, but various disciplinary-based theories relating to job quality do exist. Many scholars try to define and measure job quality, but there is no consensus on its definition and measuring indicators; the content varies according to the research fields. Typically, economists associate job quality with wages, while sociologists tend to define it from the perspective of skill, autonomy and other social aspects. In contrast, psychologists evaluate job quality based on subjective elements such as job satisfaction and engagement. However, there are still differences within the same research field. For example, the definition from economics is different among the approaches of orthodox economics, radical economics and behavioural economics. Similarly, neither are the dimensions the same when identified and measured by traditional psychological studies and industrial psychology. Therefore, job quality is commonly believed to be a multidimensional construct.

Based on the definitions and measurements of job quality suggested by different disciplines, the third part of this chapter has reviewed the existing models of job quality that have been applied by major organisations: the OECD, EU and UN. The policy models reviewed provide a practical reference for building the model, while Bustillo, who established the scientific model, offers a theoretical foundation worthy of consideration. By combining Bustillo's model with the policy models, and having checked the data availability in China, a job quality model for this research was finally generated, consisting of five dimensions and nine indicators. Consequently, this research will investigate job quality in China from the perspective of earning and benefits; working hours and work-life balance; safety, security and equality; skills and development; and autonomy and social dialogue. The data will mainly be sourced from the *China Labour Statistical Yearbook* and the *Shanghai Statistical Yearbook*.

Chapter 5. Research design

The previous chapters have reviewed the literature concerning innovation, job quality, and the model of China's economy, management and employment. Based on the review, this chapter outlines the methodological approach for this research. The first section presents the research philosophy adopted in this study by reviewing different paradigms and making a choice, through evaluation of their advantages and disadvantages. The second section focuses on the research methodology by discussing different approaches, including quantitative, qualitative and mixed-methods. By considering the strengths and limitations of each approach, a decision is made on the methods applied in this research. According to the methods chosen, the third section addresses the research design, to generate more specific and practical strategies for carrying out this research: it mainly covers framework of analysis, data generation, and design of the interview schedule.

5.1 Research philosophy

The philosophy of social science research explores philosophical questions with the support of the empirical study of human society (Risjord, 2014). Generally, three themes are involved: normativity, naturalism and reductionism. The first question of normativity explores the place of values in social scientific inquiry, asking questions concerning the objectivity, origin and function of values, rules and norms within human society, as social science is closely related to social policies. The second question of naturalism focuses on the relationship between the natural and the social sciences, and asks a series of questions, such as: Should social science follow the methods applied by natural science? or Are other methods more specialised for social science? Finally, the last question of reductionism explores the relationship between social structures and individuals who constitute them. For instance, “can all social-level correlations be explained in terms of individual beliefs, goals, and choices?” (Risjord, 2014: 1). Furthermore, there are different paradigms regarding research philosophy. A paradigm by definition is “a cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, how research should be done, and how results should be interpreted” (Bryman, 1988: 4). Among the various paradigms of social science philosophy, positivism and interpretivism are two traditional approaches adopted by social science researchers, while pragmatism provides a distinctive approach that is different from traditional approaches. Therefore, the following parts discuss positivism, interpretivism and pragmatism respectively; then, by evaluating the strengths and limitations of different paradigms, a decision will be made on the approach adopted in this research.

5.1.1 Positivism

According to Hollis (1994), positivism, in a broad sense, refers to any approach that applies scientific method to human affairs that are regarded as belonging to a natural order open to objective enquiry. Positivists hold the view that social science should reflect the procedure of the natural sciences as closely as possible, in which the research should be objective and detached from the objects of the research. Therefore, positivists believe that the “real” reality is possible to capture through research instruments (Hughes, 2006: 1).

Following Hollis’ (1994) description in broader terms, positivism aligns with empiricism in relation to scientific knowledge, which relies on observation as the moment of truth when hypotheses are tested against the facts of the world. Thus, ontology (the nature of truth) exists independently of theory and awaits observations. The positivist methodology focuses on identifying the regularities in the behaviour of particulars; however, it does not seek to detect underlying structures, forces or causal necessities. Rather, it involves theoretical abstraction and deductive reasoning, in order to arrive at improved predictions. Inductive generalisation is central, being essential to both prediction and explanation, because it plays a role in bridging the known cases and the next case. Deductive and inductive approaches work differently, in that the former tests theories while the latter develops theories. The epistemology of positivism, as Hollis (1994: 64) states, is "as basic and simple a version of empiricism as well warrants the governing precept that only perception and the testing prediction can justify claims to knowledge of the world". He suggests regarding positivism as an extreme case, because the belief that only behaviour is observable, and that limits should be set in science accordingly, is controversial.

5.1.2 Interpretivism

In contrast to positivism, interpretivism adopts a distinctive approach that considers the social world to be a subjectively experienced construct, rather than a collection of external "facts" (Mottier, 2005: 5). Interpretivism involves culturally derived and historically situated interpretations of the social world; it is often associated with the thought of Max Weber (1864-1920), who stresses the importance of *Verstehen* (understanding) in the human science, instead of *Erklaren* (explaining). Following Weber's view, the goal of social science relies on the interpretive understanding of the subjective meaning of social practices and of cultural artefacts, within which the researcher is embedded (Mottier, 2005). There are many variants of interpretivism, such as hermeneutics, phenomenology and symbolic interactionism (Hughes, 2006: 2). Consequently, while the positivists apply a way of explaining the social world objectively from the outside in, the interpretivists care more about understanding society subjectively from the inside out. In another words, positivists prefer objective data, while interpretivists favour more subjective data.

As Mottier (2005: 8-9) concludes, "the turn towards interpretation within qualitative research has a number of implications for the ways in which we think about the nature of social science data". According to Mottier, there are two main ways in which interpretivism influences social science. Firstly, it challenges the traditional idea that lived experience can be captured directly by researchers. Instead, it is mediated by the text as well as by the reflexive nature of the research process, thus creating "double hermeneutics", a process by which we construct interpretations of interpretations. To be more clear, it means "we try to interpretively read the meaning of cultural texts by writing in turn our own texts" (Mottier, 2005: 9). Secondly, it questions the identity and role of the researcher in the process. As issues such as gender, class and race, and the contextual conditions of data collection vary, the research process and the nature of the data will be shaped accordingly (Mottier, 2005).

5.1.3 Pragmatism

Unlike positivism and interpretivism, which characterise social science research in terms of ontology, epistemology and methodology, pragmatism stresses the importance of joining beliefs and actions in a process of inquiry that underlies any research for knowledge. Pragmatism insists on treating research as a human experience that is based on the beliefs and actions of actual researchers. It does not imply that the older approaches were “wrong”, but understands the prior paradigms as a set of beliefs and actions that were uniquely important within a given set of circumstances (Morgan, 2014).

Morgan (2014) points that much of Dewey’s philosophical agenda of pragmatism is highly relevant for social science research today, as he sought to break down the dualism between realism and idealism. According to Dewey (2008a), on the one hand, our experiences in the world are necessarily constrained by the nature of that world; on the other, our understanding of the world is inherently limited to our interpretations of our experiences. Within Dewey’s pragmatism and its emphasis on experience, ontological arguments about either the nature of the outside world or the world of our conceptions are merely discussions about two sides of the same coin (Morgan, 2014). Pragmatists hold the view that researchers from different traditions have very different experiences in the world of research, and these experiences lead to different beliefs and different actions, as any attempt to produce knowledge occurs within a social context. In this respect, Morgan (2007: 53) interprets the concept of paradigms in terms of the importance of “shared beliefs within a community of researchers who share a consensus about which questions are most meaningful and which methods are most appropriate for answering those questions”. Therefore, pragmatism is regarded as a new paradigm, to replace an older way of thinking about the differences between approaches to research; it treats those differences as social contexts for inquiry as a form of social action, rather than as abstract philosophical systems (Morgan, 2014). Thus, pragmatism offers “an alternative epistemological paradigm” with a new worldview that knowledge consists of warranted assertions that result from taking action and experiencing the outcome (Dewey, 2008b; Hall, 2013: 19).

Pragmatism shifts the study of social research to key questions such as: "How do researchers make choices about the way they do research? Why do they make the choices they do? And what is the impact of making one set of choices rather than another?" (Morgan, 2014: 1051). Pragmatism proposes a path that pays more attention to how factors such as historical, cultural and political contexts impact on both the choices we make and the ways we interpret the outcomes of those choices, because all our attempts to understand and act in the world are inherently contextual, emotional and social (in other words, "inquiry will always be a moral, political and value-laden enterprise") (Denzin, 2010: 424-425; Morgan, 2014). The central moral value advocated by pragmatists is freedom of inquiry, in which individuals and social communities are able to define the issues that matter most to them, and to pursue those issues in the ways that are the most meaningful to them (Dewey, 2008c; Morgan, 2014). In addition, pragmatism is often associated with the mixed-methods approach, which combines the strengths of quantitative and qualitative methods (Morgan, 2014).

5.1.4 Evaluation and choice

Positivism and interpretivism are two paradigms that adopt different standpoints in terms of ontology and epistemology, while pragmatism provides a distinctive philosophy that can account for the contradictory features of the previous paradigms without relying on assumptions about ontology and epistemology. Positivism attempts to approach social science in the same way as natural science, focusing on the explanation of the world objectively through substantial observations, while eliminating any subjective factors. Interpretivism, by contrast, is based on the subjective perspective of understanding the meaning of the society, including cultural objects and social practices. As social science involves human behaviour, which differs greatly from natural science, the interpretive way of understanding has gained ground in social science research. However, it should also be noted that the nature of the world exists objectively and shapes human behaviours. Therefore, this research holds the view that there is no absolute answer concerning which philosophies are right or wrong, because they start from different perspectives and achieve knowledge through different approaches. Each perspective has its own rationale, coupled with both strengths and limitations. Sometimes the approach depends on the specific case and discipline that is encountered. Consequently, it is not a matter of right or wrong, but a question of applicability and suitability. In this regard, the view proposed by this research is in line with pragmatism, which believes that the nature of the outside world (objective world) and the world of our conceptions (subjective world) coexist, and treats the differences between research approaches as different social contexts for inquiry. The following paragraphs evaluate the strengths and limitations of positivism and interpretivism, as well as the relative advantages of pragmatism. A decision is then reached to adopt pragmatism as the research philosophy in this study.

As mentioned earlier, positivism encourages social science to be studied systematically, similar to natural science, which allows research to study large numbers of objects and to generate findings objectively. However, as social research is filled with values, experiences and politics that are closely linked to research data, it is often critiqued, because people think that studying social life is in many ways different from studying chemicals in a lab. Moreover, there are various questions raised about the nature of social reality; for instance, “is there a ‘real’ reality (facts) that we can objectively know?” (Hughes, 2006: 1-2). In this sense, positivism might capture a part of the social world, but may lose something more essential to social science, such as values, experiences and politics, which are difficult to include and measure in a quantitative way.

Similarly, there are voices raised against interpretivism, in spite of its strength in reflecting social activities. For instance, qualitative researchers who adopt focus group interviews with a small group of individuals are criticised for “manufacturing” their data rather than “finding” it in the “field”, as “they assemble a specific research sample, linked only by the fact that they have been selected to answer a pre-determined research question” (Silverman, 2007: 31). Hence, the interpretivists are also challenged for their less formal and standard process of conducting research. Therefore, a combination of both approaches might enable them to complement each other and to reduce their respective limitations, thus being enabled to both explain the facts from the outside and understand the meanings from the inside.

Pragmatism provides an appropriate philosophy for this research’s purpose, as it breaks down the dualism between realism and idealism, believing that different approaches to research can work together. Therefore, pragmatism is adopted due to its advantages over positivism and interpretivism. First, it addresses the debate between the “objective world” and “subjective world” by interpreting different paradigms as two sides of the same coin. The differences between paradigms are explained by the “different contexts with different feelings about and different standards for the nature of inquiry” (Morgan, 2014: 1049). In this respect, positivism and interpretivism are not contradictory, but apply different approaches to address inquiry from distinctive viewpoints. Second, by stressing the centrality of human experience, pragmatism offers a practical approach to research questions. Unlike traditional paradigms which adopt a fixed research approach based on the ontology and epistemology they support, pragmatism insists on treating research as a human experience that is based on the beliefs and actions of actual researchers, believing that the knower and the known are inseparable, bound together in a process of inquiry, with a simultaneous reliance on both belief and action (Morgan, 2014). Therefore, what the pragmatists propose is not a reliance on ontological and epistemological assumptions, but the inquiry of practical research. As the inquiry of research and the relevant circumstances vary, the approach adopted can be flexible. Third, pragmatism enables a combination of the strengths of different research approaches, in order to address unique inquiries in a specific context. As it emphasises the importance of joining beliefs and actions in a process of inquiry that underlies any search for knowledge, the mixed-methods approach is often adopted in order to complement different research approaches, and it helps address distinctive inquiries within a specific context. Fourth, pragmatism as a philosophical paradigm has the advantage of naturally assigning a central role to politics and ethics in every aspect of human experience, as pragmatism's core assumptions concern the nature of inquiry, including decisions about which goals are most meaningful and which methods are most appropriate (Morgan, 2014). Issues relating to ethics, morality and politics, which are important in social science research, are already covered in the approach proposed by pragmatism.

Based on the above evaluation, positivism and interpretivism both have strengths and limitations. This research adopts the research philosophy of pragmatism as it provides a useful understanding of different paradigms and an effective approach to inquiry, thus allowing a flexible application of different approaches to address distinctive inquiries within a specific context.

5.2 Research methodology

This section discusses different types of research methods: while the quantitative and the qualitative research methods have originated from the research philosophies of positivism and interpretivism respectively, mixed-methods research, often associated with pragmatism, is a combination of both quantitative and qualitative methods. First, different approaches are introduced; then, an evaluation is made regarding their strengths and weaknesses. Finally, based on the evaluation, a decision is made and explained regarding the application of methods in this research, in order to better achieve the research objectives.

5.2.1 Quantitative approach

The quantitative research approach, featured with "positivism, measurement and statistics", has dominated the scientific literatures in many disciplines (Klee, 1999; Yu, 2006; Wang, 2010: 2). According to Duignan (2016), the methods of quantitative research are related to investigative techniques that are predominantly based on "the systematic observation, recording, and collection of numerical data associated with variables", and the descriptive and inferential statistical techniques are linked to the testing of hypotheses regarding differences and relationships among variables. Similarly, Parahoo (2014) also stresses the systematic nature of quantitative research for investigating numerical data through measuring or counting attributes, in which a situation or event can be described by answers of "what" and "how many" questions about a situation. Therefore, quantitative research is characterised by an exploration of the relationship between variables.

At the basic level of analysis, according to Duigan (2016), data can be presented in the forms of graphs and tables, and can be applied to calculate descriptive statistics for comparisons, such as sample means and standard deviations. According to different measurement scales, there are four basic types of quantitative data: the nominal (categorical), ordinal, interval, and ratio, which reflect the statistical principles of the generation, collection and process of data. Consequently, the choice of research instrument is affected by the selection of data scale. For instance, Duigan (2016) indicates that observations made at the nominal or ordinal scale may be more appropriately acquired through survey techniques such as questionnaires and focus groups, compared with those at interval or ratio scales. In terms of the interpretation of statistical test outputs, attention is usually paid to the statistical significance, the observed relationships or the differences among variables, based on statistical conventions that are generally accepted, such as the relationship between p-values and the significance level chosen. In addition to data collected from surveys, other sources can be experiments and everyday records of activities (Duigan, 2016).

5.2.2 Qualitative approach

The qualitative research approach is gaining popularity and application among researchers, especially in the field of social science. Unlike the quantitative way of dealing with numbers and correlations, the qualitative approach focuses more on words and language, and is believed to interpret more details that can not be captured by quantitative research. Qualitative research involves various methods, such as interviews, observation and documentary analysis.

There are different versions of the definition of qualitative research, mainly from three perspectives: the theoretical, methodological and historical. From the theoretical view, qualitative research is defined as “a situated activity that locates the observer in the world”, through series of interpretive and material practices that aim to understand the meaning of the world, in the forms of field notes, interviews, conversations, photographs, memos and recordings (Denzin and Lincoln, 2005: 3). According to the methodological definition, qualitative research is an umbrella term for various strategies designed to investigate topics relating to the understanding, experience and interpretation of human beings and the social world (Mason, 1996); it stresses words instead of data collection and analysis (Bryman, 2008). From the perspective of history, qualitative research refers to approaches conducted without the use of surveys or experiments. Hence, qualitative researches during the early 1970s were required to justify their selected approach. Although the three versions describe the definition of qualitative research from different perspectives, they overlap in terms of the interpretative nature of qualitative research, as well as in the importance of understanding being presented by various forms, such as words, notes, photographs and recordings.

In practice, sometimes it is difficult to investigate the overall population relevant to the topic studied, due to limited time and energy or restricted access. Therefore, a case study focusing on a small number of cases is commonly chosen as a research method. According to Yin (2003), a case study is the method of choice when the phenomenon studied is not readily distinguishable from its context. This method involves the process of case selection; some researchers adopt random selection, while others select typical cases. In addition, diverse cases and extreme cases are also applied in some circumstances (Gerring, 2007). The unit of analysis does not necessarily have to be a single organisation or initiative, but can also be two or more organisations or initiatives (Yin, 2003). In terms of social science research, scholars collecting data through interviews sometimes prefer focus groups. Nevertheless, the appropriate selection depends on the topics being researched.

There are various types of interviews identified in the literature. For example, Hitchcock (1989) distinguishes the following types of interview: structured interview, survey interview, counselling interview, diary interview, life history interview, ethnographic interview, informal/unstructured interview, and conversations. Mansion (1996) categorises interview into four groups, namely the structured interview, unstructured interview, non-directive interview and focused interview. The structured interview, also known as a formal interview, asks questions in a set order and is less flexible, because the interviewer tends to not deviate from the schedule or probe beyond the answers received. Structured and closed-ended questions are commonly applied (McLeod, 2014). Conversely, the in-depth interview or unstructured interview aims to gather much more detailed information by asking open-ended questions, in order to acquire a holistic understanding of the case. This method tries to gather as much useful data as possible and to discover any interesting area for further research (Berry, 1999). The unstructured interview has its advantages in terms of flexibility and deeper understanding, although it is more time-consuming. In addition, the non-directive interview is characterised by minimal control from the interviewer, and respondents' freedom to express their subjective feelings. Finally, the focused interview investigates participants' subjective response to a known situation in which they have been involved.

5.2.3 Mixed-methods approach

In addition to the two distinct methods discussed above, the mixed-methods approach, in which both quantitative and qualitative methods are adopted, is also commonly applied by social scientists. Based on a review of 19 definitions of mixed-methods research given by the leading mixed-methods research methodologists, Johnson et al. (2007: 123) summarise mixed-methods research as a type of research that combines "elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration". Therefore, it can be inferred that the mixed-methods approach is often applied to acquire more insights from the research and to validate the results by using both quantitative and qualitative methods simultaneously.

According to Johnson et al. (2007), mixed-methods research, in its recent history, originated from researchers and methodologists in the social and behavioural or human sciences, who believed that both quantitative and qualitative methods were useful to address their research questions. By introducing the idea of triangulation, Campbell and Fiske (1959) suggested using more than one method as part of a validation process to ensure that the explained variance is the result of an underlying phenomenon or trait rather than due to the method. It was further approved by Bouchard (1976: 268), who stated that the convergence of findings from two or more methods "enhances our beliefs that the results are valid and not a methodological artifact". Mixed-methods research enjoys a dominant position in the process of de-disciplining, due to its potential to provide the flexibility to address complex analytical and interpretive issues which arise when bringing diverse ways of thinking and different data to bear in seeking answers to multifaceted questions (Hesse-Biber, 2016). Consequently, there are two main purposes of using mixed methods. On the one hand, it is applied to ensure data triangulation. On the other hand, it is adopted in order to answer different questions; this is also the main reason for using mixed methods in this research.

In terms of the types of mixed-methods research, one classification is based on the weight put on different methods. Accordingly, there are equal-status, qualitative-dominant and quantitative-dominant mixed methods (Johnson et al., 2007). More specifically, Leech and Onwuegbuzie (2009) suggest three dimensions in the typology of mixed-methods designs: the level of mixing, time orientation, and emphasis of approaches. The level of mixing concerns whether research is partially mixed or fully mixed, while the emphasis of approach refers to whether quantitative and qualitative studies have equal emphasis (i.e. equal status) to address research questions, or whether one study has significantly higher priority than the other (i.e. dominant status). The time orientation refers to whether the two kinds of studies are conducted at approximately the same time (i.e. concurrent) or one after the other (i.e. sequential). Consequently, there are eight combinations of mixed-methods research design, according to which most mixed-methods studies can be classified, including: 1) partially mixed concurrent equal-status designs; 2) partially mixed concurrent dominant-status designs; 3) partially mixed sequential equal-status designs; 4) partially mixed sequential dominant-status designs; 5) fully mixed concurrent equal-status designs; 6) fully mixed concurrent dominant-status designs; 7) fully mixed sequential equal-status designs; and 8) fully mixed sequential dominant-status designs (Leech and Onwuegbuzie, 2009). With regard to this research, a partially mixed sequential dominant-status design is adopted, as the quantitative method is applied first, followed by the qualitative method as the major part, and the quantitative and qualitative portions of the study are not mixed until both data types have been collected and analysed. This design is chosen mainly because it can address the research questions more effectively. The evaluation of different methods and selection of the methods for this research are presented in the following section.

5.2.4 Evaluation and choice

It is suggested that research should not be taken at face value, but be appraised impartially regarding its strengths and limitations, in order to determine its credibility and applicability to practice (Lee, 2006). According to the nature of research methods, different approaches have distinctive strengths and limitations.

The quantitative research method has several benefits. For instance, it can investigate considerable amounts of data and can be applied to a greater number of subjects, which allows for a broader study and thus enhances the generalisation of the results (Clarke and Collier, 2015). Moreover, as quantitative research analyses data systematically, it can also offer greater objectivity and accuracy of results. Furthermore, compared to the qualitative approach, which is often involved with the researcher's behaviour, the quantitative research can better avoid potential personal bias that may be generated, because researchers can be distant and unknown to the participating subjects (Clarke and Collier, 2015). Therefore, by using the quantitative method, researchers can achieve objective findings of the study.

However, the quantitative approach also has some limitations. First, the context of research is often ignored, because quantitative research does not investigate data in a natural setting, or consider opinions from different people, as qualitative research does. Second, the quantitative method requires a large population sample, because the larger the sample, the more accurate the statistical results will be. Third, it requires more complex preparation before research, including rigorous research design, a sound sampling scheme, reliable and valid instruments, and a meticulous data-cleaning mechanism.

There are some advantages of applying qualitative methods. For example, a case study using interviews is suitable for answering questions relating to "how" and "why", because it can capture more information about how the research topic is understood, as well as acquiring more areas of research interest, especially when theory is lacking and grounded theory is applied. Such benefits cannot be achieved through quantitative research methods, because they cannot always establish the meaning, behaviour and expression of the participants; although they perform better in terms of numbers and the quantitative relationship between variables. Moreover, due to the variations in level of research and type of interview, the method of the qualitative case study with interviews can be applied flexibly based on the needs of research.

Despite the strengths stated above, the qualitative method has some limitations. First, it is difficult to predict quantitative relationships in qualitative studies, as data are gathered in words. Second, this method is not suitable for testing hypotheses and theories with a large participant pool. Third, it is time-consuming in terms of data collection and data analysis, because interviews involve long conversations with informants and time is required for recording and analysing. In comparison, quantitative research is often conducted with questionnaire surveys, which make it quicker and easier to acquire answers from numerous informants.

Fourth, the results of qualitative methods can be easily influenced by the researcher's personal biases and idiosyncrasies.

Based on the above evaluation, this research adopts a mixed-methods approach with an initial quantitative analysis of available data, followed by qualitative interviews conducted in a sample of companies, in order to better answer the research questions and achieve the objectives. Although the available statistics for innovation and job quality in China are limited, which could not support in-depth quantitative analysis in China, the mixed-methods approach helps address the relevant problem by allowing both quantitative and qualitative methods to complement each other, in order to acquire more information and achieve a comprehensive understanding of the research topic. The quantitative part aims to assess the levels of innovation and job quality in different Chinese industries, and helps identify industries for case studies in an objective and systematic way; while the qualitative part mainly explores *what* the relationship is between innovation and job quality, *why* this relationship exists, and *how* innovation and job quality interact with each other, from the perspective of subjective understanding. By firstly providing an overall idea of the features of different industries, the statistical analysis also helps narrow down the focus of the subsequent qualitative research, in terms of not only the selection of industries, but also the questions that are worth exploring. To summarise, a combination of both methods allow them to complement each other, thus achieving more comprehensive knowledge of innovation and job quality in China. Based on the decision to use a mixed-methods approach, the following section presents the specific research design for this thesis.

5.3 The research design for this thesis

Before starting practical research, it is important to establish an analytical framework as a theoretical guidance for both the quantitative and qualitative analysis. The quantitative research will analyse secondary statistical data in key aspects of innovation and job quality according to the framework, and the qualitative research will analyse data collected through primary research that is also based on the framework of analysis. This section first discusses the research framework applied in this research, and then explains the design of both quantitative and qualitative research in the data generation part, covering key aspects such as methods, process, data sources and ethical considerations. As this thesis mainly focuses on the qualitative research, the last part of this section presents the design of the interview schedule in detail, including key questions and the interview design.

As the aim of this research is to explore the relationship between innovation and job quality in China, but relevant theory is lacking, it adopts an inductive approach to achieve conclusions. The research starts with the statistical analysis of secondary data, in order to assess different Chinese industries in terms of their levels of innovation and job quality, and to help identify the appropriate industries for the following case studies. Then, the qualitative analysis combines specific interview answers to form a broader generalisation, leading to conclusions on the overall relationship between innovation and job quality in China. Based on the results from both analyses, key findings and policy implications will be presented.

5.3.1 Framework of analysis

The analytical framework for this research is based on the definitions of innovation and job quality, as discussed in the literature review in the previous Chapters 3 and 4. Innovation refers to the successful exploitation of a new idea, as well as carrying it out in practice (DTI, 2003; Fagerberg, 2005). Job quality is defined as the characteristics of a job in various aspects which have an influence on workers' well-being (Muñoz-de-Bustillo, et al., 2011). The definitions summarise different attributes of innovation and job quality in the models. According to the findings from the literature review (see Chapters 3 and 4) regarding measurement and Chinese government policy, the ideal model of innovation in this research comprises three dimensions and eight indicators, and the ideal model of job quality consists of five dimensions and eleven indicators, corresponding to main traditions of research on job quality.

Table 5.1 and Table 5.2 present the model of innovation and the model of job quality respectively, both including two parts: the ideal model, and data availability in China. The ideal models provide an overall guidance for both quantitative and qualitative research. The data availability indicates the statistical data in China that can be accessed. Currently, the main data sources in China are the *China Science and Technology Statistical Yearbook* and *China Labour Statistical Yearbook*, two statistical reports published annually based on national surveys conducted jointly by the National Bureau of Statistics, Ministry of Science and Technology, and Ministry of Human Resources and Social Security, on activities relating to China's science and technology and labour respectively. The yearbooks cover series of data at both industry and regional levels, including 19 industries and 31 provinces and municipalities in China. The yearbook on science and technology (S&T) consists of nine sections, ranging from general information on S&T activities for the whole society, to specific focuses on industrial enterprise, research institutions, higher-education institutions, high-tech industry, the national programme for science and technology, results for S&T activities, S&T services and activities of the China Association for S&T, and information on international data. The yearbook on labour, similarly, moves from a general report to specific areas, including employment and unemployment, total wages, vocational training and skill appraisal, labour relations, social security, and trade union works. Both of the yearbooks contain key data in framework models; therefore, the data sets can be constructed from the two sources.

However, the statistical data for some of the indicators listed in the ideal model are missing: for example, there are no data for working time arrangements and balancing work and non-working life. Therefore, these indicators in the ideal model cannot be measured and evaluated in the statistical analysis. Thus, this will be complemented by subsequent qualitative analysis which will gather data from interviews. Questions about work-life balance will be asked during the interviews, in order to collect relevant answers that are not provided in the quantitative research.

The three dimensions of the innovation model – innovation inputs, research and technology collaboration, and innovation outputs – are included to reflect the level of innovation comprehensively, given that different stages of innovation are involved, and key aspects concerning the efforts, results and dynamics of innovation are considered. First, the "innovation inputs" dimension indicates forms of resources that a firm invests in innovation, including innovation expenditure, human resources and facilities. According to the statistical data provided by the Chinese government, the indicator of innovation expenditure relates to internal R&D spending; the human resources indicator includes data about the numbers of R&D personnel; and the facilities indicator reflects the number of R&D institutions. Second, the "research and technology collaboration" dimension measures the activities devoted to innovation, represented by research and development, research publication, and innovation resource integration. The available data in China for the indicator of research and development are the number of R&D projects. Data of S&T papers issued and S&T publications can be obtained, representing the indicator of research publication. The innovation resource integration indicator is reflected by imported technology contracts. Finally, the third dimension evaluates the innovation results of a firm in two key aspects: the new products and intellectual assets. The new products indicator, though lacking direct data at industrial level, can be captured through statistics of major S&T research achievements, on the basis that this research focuses on technological innovation in which new products are created based on S&T breakthroughs. The intellectual assets indicator, on the other hand, includes data for patent applications and patents in force.

Table 5.1 The ideal model of innovation and its data availability in China

<table>
<tr><th colspan="2">The ideal model of innovation</th><th rowspan="2">Data available in China at industrial level[8]</th></tr>
<tr><th>Dimensions</th><th>Indicators</th></tr>
<tr><td rowspan="3">Innovation inputs</td><td>1. Innovation expenditure</td><td>Internal R&D spending</td></tr>
<tr><td>2. Human resources</td><td>R&D personnel</td></tr>
<tr><td>3. Facilities</td><td>R&D institutions</td></tr>
<tr><td rowspan="3">Research and technology collaboration</td><td>4. Research and development (R&D)</td><td>R&D projects</td></tr>
<tr><td>5. Research publication</td><td>S&T papers issued; S&T publications</td></tr>
<tr><td>6. Innovation resource integration</td><td>Imported technology contracts</td></tr>
<tr><td rowspan="2">Innovation outputs</td><td>7. New products</td><td>Major S&T research achievements</td></tr>
<tr><td>8. Intellectual assets</td><td>Patent applications; patents in force</td></tr>
</table>

Source: *China Science and Technology Statistical Yearbook, 2015.*

In comparison, there are more dimensions in the ideal model of job quality,

[8] More data are available at country level, including: employee training funds, technical personnel, R&D activities, expenditure on technology import, expenditure on domestic technology acquisition, expenditure on technology assimilation, expenditure on technology renovation, external R&D spending, new products, and sales revenue of new products.

due to its multidimensional nature suggested by different disciplines. The ideal model in this research evaluates job quality from an objective perspective, because objective attributes are easier to obtain through statistical data and subjective cognition. Job satisfaction, for instance, can be affected by expectations of the job, thus leading to inconformity among expectations of different jobs (Green, 2006). The ideal model combines different attributes of job quality: earnings and benefits from job; working hours and work-life balance; safety, security and equality; skills and development; and autonomy and social dialogue. First, the "earnings and benefits from job" dimension considers both wage and non-wage pecuniary benefits at work, in which the former is measured by average wage per year. Second, the "working hours and work-life balance" dimension concerns time issues relating to employees' work and non-working life. Indicators of working hours, working time arrangements, and balancing work and non-working life are included; the relevant statistical data in China are weekly working hours. Third, the "safety, security and equality" dimension assesses the quality of a job from the perspectives of workers' health, access to labour market and social protection, and equal treatment. It involves three indicators: safety at work, security of work, and fair treatment and equality. Security of work can be captured through employment; fair treatment and equality involves data about the employment rate gap between men and women and the working hours gap between men and women. The last two dimensions – "skills and development" and "autonomy and social dialogue" – evaluate job quality from a sociological approach that focuses on skills and autonomy; these are presented by training, qualifications, and rights to organise and bargain. The qualifications for work can be assessed by educational attainment.

Table 5.2 The ideal model of job quality and its data availability in China

The ideal model of job quality		**Data available in China at industrial level**[9]
Dimensions	**Indicators**	
Earnings and benefits from job	1. Wage	Average wage
	2. Non-wage pecuniary benefits	*
Working hours and work-life balance	3. Working hours	Weekly working hours
	4. Working time arrangements	*
	5. Balancing work and non-working life	
Safety, security and equality	6. Safety at work	
	7. Security of work, e.g. access to labour market, social protection	Employment rate
	8. Fair treatment and equality	Employment rate gap between men and women; working hours gap between men and women
Skills and development	9. Degree of training	*
	10. Qualifications for work	Educational attainment;
Autonomy and social dialogue	11. Rights to organise and bargain collectively	*

Source: *China Labour Statistical Yearbook, 2015.*
* Statistical data are not available at industry level.

5.3.2 Data generation

This part begins by describing the design of the quantitative research, and then introduces how the subsequent qualitative research will be conducted. The quantitative part will firstly be conducted for all industries in China except agriculture, because the wages in agriculture are not reliable due to

[9] More data are available at country level, including: pension insurance; basic medical insurance; maternity insurance; work injury insurance; work injury certification; unemployment insurance; labour and social security inspection; social insurance funds; number of employment training centres, teachers and staff, trainees and graduates; training funds; occupational skill testing; labour disputes accepted and settled.

the existence of a large amount of informal work. Based on the framework of the innovation model and job quality model of this research, descriptive statistical analyses at industry level will be performed for indicators of innovation and job quality, in order to acquire levels of innovation and job quality in different Chinese industries, to explore the various configurations between innovation and job quality in China, and to help identify industries for qualitative case studies. According to the distribution of industries, a four-quadrant matrix (see Figure 5) will be generated subsequently including four types of industries: industries with high innovation and high job quality (HH); industries with high innovation but low job quality (HL); industries with low innovation but high job quality (LH); and industries with low innovation and low job quality (LL). If an industry's innovation level is higher than the average, it will be populated into the matrix as a high innovation type; if its innovation level is lower than the average, it will be treated as a low innovation type. The same categorisation criteria apply to job quality typology. The data sets for statistical analysis are constructed from existing secondary data. The major source of innovation data is the *China Science and Technology Statistical Yearbook 2015*, while job quality data are mainly obtained from the *China Labour Statistical Yearbook 2015*. The selection of industries for case studies is based on the four-quadrant matrix that has been generated. Industries in different quadrants will be chosen; thus different types of industries will be interviewed.

Figure 5.1 Matrix of innovation and job quality

High innovation High job quality (HH)	High innovation Low job quality (HL)
Low innovation High job quality (LH)	Low innovation Low job quality (LL)

The qualitative part will apply the case study method by collecting primary data from interviews. Based on the matrix identified in the statistical analysis, the qualitative research at company level will conduct two case studies, comprising one state-owned enterprise and one private enterprise per quadrant. Therefore, eight organisations in total will be selected. As Shanghai is the largest centre of the economy, finance, trade, information, and science and technology in mainland China, and has a similar economic and employment composition and structure to that of China as a whole statistically, it will be the geographical focus of the qualitative part due to the important role it plays in China and the similarity of its economic and employment structure to that of China. According to the statistics (see Chapter 2: 2.3), the tertiary or service industry plays a dominant role in economic contribution and employment, with most people employed in private enterprises, which include typical industries such as retail and wholesale, hoteling and catering, information transmission, software and IT services, and real estate. State-owned enterprises, though reduced in proportion after economic reforms, still dominate several industries, including public administration, social security and social organisations, health and social work, and education (Shanghai Statistics Bureau, 2014). Because of their continued dominance in some industries, both state-owned enterprises and private enterprises are included in the study.

Regarding the types of interview, there are both advantages and disadvantages of each of the three distinctive methods: the structured interview, semi-structured interview and unstructured interview, which adopt different types of questions respectively. In order to identify the appropriate type of interview for this research, the following paragraphs discuss the strengths and limitations of the three interview types. Through evaluation and comparison of different types, a decision is made on which interview type is adopted. First, as the structured interview presents standardised questions to participants, respondents are given equal opportunities to give answers within the same research construct. Firmin (2008a) concludes that the structured interview is beneficial in four occasions. The first occasion is using structured interviews to make a comparison between groups because only by asking the same set of questions can different groups under investigation be compared. The second situation is conducting interview waves, in which structured interviews are carried out first, during the initial stage of contacting participants; they are usually followed later by semi-structured interviews. Third, it can function as a supplement to quantitative research, because the interpretations are easier to integrate into quantitative findings. In contrast, both semi-structured and unstructured interviews are difficult to quantify, due to the variations in questions asked and data collected. The fourth benefit of the structured interview, according to Firmin (2008a), lies in its advantage for investigating low-functioning individuals, as it helps them to focus on the subject, and offers security by making it clear why they are providing data to the researcher. Moreover, the structured interview, delivered as a survey or questionnaire, for example, can reach a larger and more representative sample than the other types of interview. Furthermore, due to the predetermined questions, structured interviews tend to take less time than semi-structured or unstructured interviews.

However, despite the strengths stated above, the structured interview has some weaknesses. On the one hand, respondents are confined to answering fixed questions, even with fixed options, which prevents them from expressing themselves freely. Thus, if the prepared answers deviate from the truth, the validity of data becomes questionable. On the other hand, the interviewers have to stick to the questions given, even though some interesting topics and enquires may emerge during the interview. Therefore, reliable data on attitudes, opinions and values are difficult to gather in structured interviews.

The second type, the semi-structured interview or in-depth interview, which occupies the middle ground between a rigid structure and complete uncertainty, offers researchers in-depth data on the topic focused on without determining the results beforehand (Cook, 2008). The method is effective because it allows participants to answer questions in more detail and provide more valid information regarding their values, attitudes and opinions; especially in terms of how they explain and contextualise the issues under investigation. In this informal way, participants can be more open and honest. Moreover, flexibility can be ensured because the interviewer can adjust questions and change direction as the interview progresses. Furthermore, Johnson and Rowlands (2012) suggest that semi-structured interviews are well suited to qualitative research, life-story research, the collection of personal narratives and oral histories; as well as for the grounded theory methodology, where data of great depth is needed, where complicated and divided perspectives exist among different individuals and groups, and where knowledge is not yet articulated by most members. More importantly, semi-structured interviews are helpful for exploring the context and mechanism of a causal explanation, in which other methods such as surveys, experiments and direct observation often cannot achieve (Johnson and Rowlands, 2012).

The in-depth information acquired through the semi-structured interview constitutes the key advantage of this type, but simultaneously it can trigger some risks and concerns relating to ethical issues, given that personal and private information is likely to be revealed during the interview. Relevant threats include the negative consequences for lives and reputations if the data involve deviant or illegal activities, or negative opinions about the setting or occupation (Johnson and Rowlands, 2012). Another criticism questions the extent to which the researcher can interpret the experience and get insights from participants, because it is limited by participants' recall, their ability to articulate experiences within the time frame, and the interviewers' ability to cast "right" questions that entail further discussion and assist the analysis (Cook, 2008). In addition, Johnson and Rowlands (2012) point out that the analysis of semi-structured interviews lacks the quantification, and they are not suitable for generalising to the wider population. Thus, semi-structured interviews are not typically adopted in "explanatory studies that aim to produce causal explanations according to the deductive criteria of the association, logical time order, and nonspuriousness of predetermined independent and dependent variables" (Johnson and Rowlands, 2012: 101).

The third type, the unstructured interview, has advantages in terms of five perspectives, according to Firmin (2008b). The first situation suits studies that are relatively new, where a set of predetermined questions are unlikely to be provided. In this situation, the inductive unstructured interview is more appropriate. The second advantage is that the unstructured interview is helpful in research waves, in which qualitative researchers can begin with the unstructured method and then switch to more structured interviews later during data collection. Third, the unstructured interview is useful when researchers are more interested in detailed information. It serves as a superior way within the time frame. Fourth, unstructured interviews are especially suitable for ethnographic research, because instead of asking pre-established questions, conversations with participants can occur naturally during the process of staying with the group, learning their culture and perspectives. The last benefit pointed out by Firmin (2008b) is that the method of unstructured interviews allow researchers to obtain insights from particularly articulate respondents that more structured methods cannot. Apart from this, unstructured interviews have the strengths that are similar to semi-structured interviews, such as clarity of understanding and meanings, flexibility of changing questions and directions, and more valid and richer data.

Although the unstructured interview has strengths in several aspects, it is limited in certain areas, mainly due to its unstructured methodological features. On the one hand, as the interviewer does not ask the same question every time, this method is less reliable than structured and semi-structured interviews. On the other hand, it is difficult to replicate the study because the questions can change, making every interview distinctive. Moreover, the detailed qualitative data gathered from the study are also difficult to analyse and compare with other data, especially in a quantitative way (Cook, 2011).

According to the strengths and weaknesses of the different types of interview evaluated above, it is appropriate for this research to adopt the semi-structured interview method. This method is chosen mainly based on the research questions and aims of the qualitative research part, given that the semi-structured interview can help explore in-depth data about the relationship between innovation and job quality in the selected cases in China. With several prepared questions having been elicited from the previous statistical analysis, more questions can emerge as the interviews progress. Such a flexible structure enables the conversation to remain centred on the topic of interest while allowing participants to express their own opinions. In addition, a comparison can be made between different cases studied, thus helping the later analysis to reach a joint conclusion.

In terms of the selection of participants, the sample of interviewees should be relatively homogenous and should share similarities with respect to the research question, given that in-depth interviews are designed to explore shared understandings of a group (McCraken, 1988; DiCicco-Bloom and

Crabtree, 2006). The selection should be made in order to obtain richer and deeper information to address the research question (Kuzel, 1999). Therefore, candidates who are in charge of the innovation activities of their company, and who are familiar with the job quality of employees, will be selected for interviews, because common insights are more likely to be acquired from them. However, flexibility will be included by taking the profile of the workforce into consideration. For instance, HR managers and R&D personnel are suitable participants, because the former are familiar with job quality, while the latter are most concerned with innovation activities. In case of the lack of an R&D department in some companies, appropriate candidates can be selected from other departments that are most related to innovation. The process of interviewing will mainly include the stages of interview schedule design, project introduction, questions and answers, analysis, and conclusion. A discussion guide will be applied, and the transcripts will be coded by themes, using NVivo. Unlike the statistical analysis, the interviews aim to explore the relationship between innovation and job quality, the reason for the results indicated by the quantitative research, and the workplace practices that underpin high innovation and high job quality in China.

According to discoveries that have resulted from hands-on experience by qualitative researchers, there are several techniques for conducting interviews. For example, it is better to begin an interview with the topic the participants are most comfortable with. DiCicco-Bloom and Crabtree (2006) suggest three phases during the interview: the exploration phase, co-operative phase and participation phase. In the first phase, the interviewees become engaged in the in-depth description, achieved by "learning, listening, testing and a sense of bonding and sharing" (DiCicco-Bloom and Crabtree, 2006: 317). The next phase features a level of comfort and satisfaction, with the interviewer clarifying some points and the interviewee correcting the interviewer, thereby reaching a state of making sense together. Hence, sensitive questions that are not appropriate to ask at the beginning can be posed at this point. Lastly, the third stage, the participation phase, can emerge if the rapport between interviewer and interviewee is developed, and the interviewee plays a role in guiding and teaching the interviewer (DiCicco-Bloom and Crabtree, 2006). Therefore, it is important for this research to pass through these three phases, so that the interviewer can quickly gain a rapport with interviewees.

It is also important to choose the optimal time for interviewing, because the quality of the interview can be affected by this factor. Moreover, it is necessary to reconfirm the information when participants provide contradictory comments. Furthermore, researchers are advised to be sensitive to individual situations, and to allow flexibility in different interview circumstances (Berry, 1999). Therefore, this research will adopt the above techniques, in order to ensure that interviews can proceed successfully, and to avoid potential ethical concerns that may be raised during the interview, with regard to participants' rights.

Another issue that inevitably arises during the interview is ethics; this is because qualitative interviewing is a practice that has the potential to touch the private lives of participants with the intention of putting their information in public (Brinkmann, 2008). The confidentiality, informed consent and consideration of the consequences of participating the study should be ensured (Brinkmann, 2008). Therefore, special attention will be paid to various ethical issues in this research, including efforts to respect participants' rights and dignity, to obtain informed consent from participants, to ensure the privacy and confidentiality of data, to protect the safety and security of participants, to provide support for participants that will prevent sensitivity and dilemma, and to guarantee the integrity of the interview report. For example, all interview participants will be volunteers and the project will be explained to them before the interview starts. The respondent information sheet and consent form, which indicate the nature of the interview (such as its voluntariness, confidentiality, anonymity, and the purpose of the research and interview recording), will be signed by the participants, in order to guarantee respect for their rights and dignity. Also, to ensure privacy, data records will be kept in the researcher's own laptop, protected by a password; and any hard copies will be kept safely, with restricted access. Participants will be anonymised, with pseudonyms applied before the data are saved. In addition, a possible ethical dilemma in this research would be participants' unwillingness to tell the truth if they have a low level of job quality, or if their organisation is not innovative. This problem can be solved by reassuring participants about their anonymity and confidentiality, as well as stressing the purpose of pure academic research. Also, by providing a comfortable and relaxing atmosphere, efforts will be made to engage more with participants, to make them willing to express ideas honestly, without having concerns. Similarly, sensitive questions will be reworded in order to make participants feel comfortable about giving true answers. If sensitive issues are raised or a participant becomes upset, the recording will be stopped until the interviewee is happy to proceed. The ethical approval for this research has been granted by the University of Warwick.

5.3.3 Design of the interview schedule

This section focuses on the construction of the interview schedule for this research. The first part returns to the different potential mechanisms between innovation and job quality suggested in the literature as a reference for the interviews that explore the relationship between innovation and job quality in China. Together with the consideration of China's situation and the results of statistical analysis, key questions are identified, which generate a set of predetermined questions to be asked in the interviews. The second part discusses other important issues, involving the interview participants, interview locations, informed consent, and the information sheet. The interview design aims to effectively address the research questions, which concern how innovation and job quality interact with each other in China, and the consequent policy implications.

5.3.3.1. Identifying key questions

Few studies explain the relationship between innovation and job quality. Muñoz-de-Bustillo et al. (2016) present four transmission mechanisms that relate innovation and job quality; they focus on technological innovation, which is consistent with the main scope of this research. The first three mechanisms describe innovation's impact on job quality, while the fourth mechanism confirms job quality as a driver of innovation. Specifically, the first mechanism describes innovation's role on the growth of productivity through increased wages and decreased working time, which indicates improved job quality. The second mechanism concerns innovation's impact on the nature of jobs, through changes in the working conditions and environment. The third mechanism explains innovation's influence on job quality through structural changes of the economy, including production and employment, while the last mechanism states that job quality can in turn promote innovation (Muñoz-de-Bustillo et al., 2016). Although the mechanisms are not explained in detail, they provide directions that may be helpful for this research to explore. Consequently, the interviews in this research are designed to explore how innovation and job quality affect each other in Chinese enterprises; including both innovation's impact on job quality, and conversely, job quality's impact on innovation; they will also reveal the mechanisms that operate between them, and show which one is more common and applicable in China.

Regarding China's situation, the previous chapters have indicated that the Chinese government greatly emphasises the promotion of technological innovation, while less attention is paid to job quality. Due to the large labour force and strong competition in the labour market, the importance of job quality in China is less recognised than in Western countries. Therefore, it is valuable to explore whether higher job quality can lead to innovation in China, on the basis that job quality can be a potential stimulus for innovation. If this link is proved in this research, it will be important to recommend the promotion of job quality to policy makers in China. Consequently, job quality might be reconsidered, and act as an alternative initiative for innovation in China. In addition, as Chinese enterprises are highly encouraged to innovate, job quality is likely to be improved as a result. Therefore, this research can achieve another purpose, that of identifying whether innovation triggers higher job quality in China, and how it affects job quality; this is an unprecedented investigation on innovation and job quality in China.

As the statistical analysis identifies different configurations between innovation and job quality levels in Chinese industries, the interviews also aim to reveal why such difference exists. Moreover, as the statistical analysis is based on the available data from the Chinese government, the qualitative interviews can thus explore data that are not available in statistics. For instance, the dimension of working hours and work-life balance in the original model of job quality contains indicators of working time arrangements and balancing work and non-working life, for which there is a lack of statistical data in China; hence, the interviews can ask relevant questions about these indicators. Similarly, training, autonomy and other aspects of job quality in the model can be addressed in the interviews. The key questions are presented in the interview schedule, given in Appendix 6.

In summary, there are three goals of the qualitative research: first, to find out why different types of industries exist; second, to investigate the causality directions between innovation and job quality; and third, to explore the data of innovation and job quality that are missing in statistics.

5.3.3.2. Designing the interviews

The interview design involves the key issues of selecting participants and locations, and creating a respondent information sheet and respondent consent form before conducting the interviews. The interview participants come from the enterprises in the four industries that were selected according to the statistical analysis, including industries with high innovation and high job quality, high innovation and low job quality, low innovation and high job quality, and low innovation and low job quality. In order to address research questions properly and to acquire richer and deeper insights from participants, both employees and managers who are in charge of innovation activities and who are more familiar with employees' job quality in the company, are chosen as interview participants. The interviews are conducted in a safe and comfortable place, without interruption, and normally last for one hour.

Before starting the interview, participants are first introduced to the research through the participant information sheet (Appendix 7), and are asked to sign the respondent consent form (Appendix 8) which indicates the nature of the interview, such as its voluntariness and confidentiality, and the purpose of the research. In addition, their anonymity is ensured throughout the research. The interviews are recorded and the data are kept safely, with restricted access. The findings will only be used for this PhD thesis, and relevant reports and publications. Further consent will be sought from participants if there is any change to these conditions.

5.4 Conclusion

This chapter has discussed the research design, moving from the philosophy of social science research to the specific methods and processes of conducting this research. The purpose of this chapter was to explore the most appropriate research design for this research topic, and to more effectively answer the relevant research questions. The research philosophy section firstly raised a key question regarding the approach for conducting social science research: Should social science be studied in the same way as natural science, or should it be done differently? Such a controversial debate has resulted in different streams in academic research. Positivism and interpretivism are two traditional paradigms that apply different approaches to investigate social science-related subjects. While positivism follows the tradition of natural science, interpretivism prefers to learn from subjective perspectives, as it argues that social science is closely linked to human activities and culture, which are essential and should not be neglected. The new paradigm of pragmatism accepts the traditional paradigms, believing that they are not contradictory, but two sides of the same coin; this phenomenon is rooted in different social contexts. Pragmatism emphasises the importance of joining beliefs and actions in a process of inquiry that underlies any search for knowledge.

It is important to consider which research philosophy will be adopted when designing research. The evaluation of paradigms concludes that it is not a matter of which philosophy is right or wrong, because both positivism and interpretivism have strengths and limitations. Instead, it is a question of suitability and applicability, depending on the specific cases and disciplines encountered. Therefore, this research has decided to adopt the philosophy of pragmatism, which favours a combination of different methods to better address specific research questions. In this research, job quality, for example, can be assessed objectively through statistics such as wages, working hours and training, or it can be evaluated subjectively through people's perception. Therefore, both objective and subjective elements are involved in this research. Consequently, it is believed that combining different approaches allows them to complement each other, enabling them to capture both facts from the outside and meanings from the inside.

The second section discussed research methodology, in terms of the three approaches of quantitative, qualitative and mixed-methods, which function differently. According to the characteristics mentioned, the quantitative approach, which involves conducting research systematically and objectively through calculations of statistical data, follows the idea of positivism. The qualitative approach, which by contrast features words and language rather than numbers, relates to interpretivism, which stresses the significance of understanding. The mixed-methods approach adopts both quantitative and qualitative research methods. Through evaluation, the quantitative research method provides greater accuracy, objectivity and generalisation of results; however, it requires a large sample and complex preparation. The qualitative research method, in comparison, works effectively to answer questions relating to "how" and "why", especially when theory is lacking. Moreover, qualitative research can be designed flexibly in different levels and types, according to the research purpose.

Nevertheless, the qualitative method has some weaknesses, such as the difficulty of predicting a quantitative relationship, the time needed to generate and analysise the thesis, and a risk of the researcher's personal bias. Consequently, a mixed-methods approach is chosen in this research, with an initial quantitative analysis of available data, followed by qualitative interviews in a sample of companies; this will achieve more comprehensive knowledge of the relationship between innovation and job quality in China, using an inductive approach.

Table 5.3 Summary of quantitative and qualitative purposes

	Step 1: Quantitative Analysis	**Step 2: Qualitative Analysis**
Purpose	To find out "what"	To find out "How" and "Why"
Aims	1. To acquire levels of innovation and job quality in China statistically at industry level. 2. To use statistical analysis to populate the four quadrants of innovation and job quality to help identify case study industries.	1. To explore the interactive relationship between innovation and job quality within case studies.

The third section focused on the specific research design in this thesis. The analytical framework for this research works as guidance for both the quantitative and qualitative parts, and is built on extensive literature review conducted in previous chapters. The selection of the dimensions and indicators in the models aims to cover the different attributes of innovation and job quality that are most important. By comparing the models of both innovation and job quality, it can be discovered that the two models overlap in terms of training; this indicates the potential relationship between innovation and job quality. However, within this framework, innovation, job quality and their relationship will be systematically analysed in the quantitative and qualitative research. The quantitative research will conduct statistical analysis based on secondary data from the Chinese government, in order to assess the current state of innovation and job quality in China, as well as the different configurations between innovation and job quality at industry level; while the qualitative research using case study interviews will mainly explore the interactive relationship between innovation and job quality. It will also obtain further information that is not available in the quantitative research, such as data on work-life balance and workplace practices, which underpin high innovation and high job quality in China. In addition, voluntariness, confidentiality and anonymity will be ensured, in order to avoid any ethical concerns and dilemmas during the interviews. In conclusion, the research design analysed in this chapter will help to achieve an empirical and theoretical understanding of the relationship between innovation and job quality in China.

Chapter 6. Statistical analysis

This chapter focuses on innovation and job quality in China at industry level, using statistical analysis. The analysis is based on the framework discussed in Chapter 5 and on the data available in China. Before starting the analysis, the first section introduces the data source and the sample. There are three objectives in this chapter: the first, presented in section 2, is to discover the overall levels of innovation and job quality in different industries. In order to achieve this, variables from different dimensions are aggregated into one single index, for the sake of easy comparison. Both the index of innovation and index of job quality are generated and calculated in the analysis. The second objective, discussed in section 3, is to draw different configurations between innovation and job quality among Chinese industries, based on the results of the innovation index and job quality index. As a result, a four-quadrant matrix is created, populating industries into relevant blocks. Consequently, the characteristics of Chinese industries regarding levels of innovation and job quality are obtained, which provide evidence for selecting industries to participate in the later interviews. Finally, the third objective is to discuss the selection of industries for the following research, based on the results from the matrix. Other factors such as enterprise size, ownership type and access are also considered.

6.1 Data source and sample

The *China Science and Technology Statistical Yearbook 2015* and *China Labour Statistical Yearbook 2015* are two important yearbooks officially published by the Chinese government; moreover, at the time when this statistical analysis started, they provided the most recent data, from 2014. The *China Science and Technology Statistical Yearbook* is co-edited by the

National Bureau of Statistics and the Ministry of Science and Technology, which reflects the scientific activities, projects and achievements among industries, R&D institutions and higher-education institutions. It includes data at different levels, including national, regional and industrial. As this research focuses on technological innovation and analyses different industries, these yearbooks are the most suitable source of data for innovation. The *China Labour Statistical Yearbook*, on the other hand, is co-edited by the National Bureau of Statistics and the Ministry of Human Resources and Social Security, which gathers data concerning different aspects of labour. Similar to the *China Science and Technology Statistical Yearbook*, it contains data at different levels, including national, regional, industrial and types of enterprise. Hence, this research collects job quality-related data in different industries from this yearbook.

In terms of the sample, the two yearbooks overlap in the following 19 industries: agriculture; mining; manufacturing; production and distribution of electricity, gas and water; construction; wholesale and retail; transport, storage and post; hoteling and catering; information transfer, software and IT services; finance; real estate; leasing and business services; scientific research and technical services; water conservancy, environment and public facilities; household services; education; health and social services; culture, sports and entertainment; public administration and social security. In consideration of the special condition of agriculture, which involves much informal work and unreliable wage data, it is excluded from the analysis, in order to ensure validity and reliability. Moreover, when checking the data from the yearbooks, some statistics were found to be missing. For example, in three industries – hoteling and catering; real estate; and leasing and business services – there is a lack of data for innovation, such as internal R&D spending, S&T publications, and major S&T research achievements. Therefore, these industries are also removed from the analysis, due to incomplete data sets. Consequently, this research makes a statistical analysis of the following 15 industries:

1. mining;
2. manufacturing;
3. production and distribution of electricity, gas and water;
4. construction;
5. wholesale and retail;
6. transport, storage and post;
7. information transfer, software and IT services;
8. finance;
9. scientific research and technical services;
10. water conservancy, environment and public facilities;
11. household services;
12. education;
13. health and social services;
14. culture, sports and entertainment;
15. public administration and social security.

According to the yearbooks, the enterprises in each industry are corporate enterprises with more than 20 million yuan (equivalent to USD 2.9 million) of main business turnover annually. Therefore, all the enterprises investigated are large and medium-sized enterprises.[10]

6.2 Innovation index and job quality index

The index of innovation and index of job quality are designed to aggregate

[10] Large-sized enterprises have more than 1000 employees and above 400 million yuan of main business turnover annually. Medium-sized enterprises have between 300 to 1000 employees, and generate an annual main business turnover of between 20 million and 400 million yuan (National Bureau of Statistics, 2015).

variables in order to reflect the overall levels of innovation and job quality respectively. According to the framework, both the innovation model and job quality model consist of various indicators and dimensions. Therefore, it would be difficult to compare different variables and draw conclusions regarding their overall levels. However, the index of innovation and index of job quality established below have benefits in three aspects. First, they scale variables with different units into values that are comparable and calculable. Second, they follow the structure of the framework and give equal weights to dimensions and variables that are at the same hierarchical level, thereby creating a consistent structure between index and framework. Third, with the output of the indexes, it is easy to analyse different industries and make comparisons. The following sections explain the construction of the two indexes and the meaning of the variables.

6.2.1 Index of innovation

Based on the innovation model discussed in Chapter 5, the index of innovation is generated following the same structure with three dimensions, and the same weights are given to dimensions or variables at the same level. For instance, each dimension receives the equal weight of 33.3%, as each constitutes one-third of the total. Moreover, they are split into further variables, with equal percentages at the same layer. For example, the internal R&D spending, R&D personnel rate and R&D institutes represent the dimension of innovation inputs from different aspects, including R&D expenditure, human resources and facilities; they therefore receive 11.1% weight respectively. In the second dimension, the R&D projects, imported technology contracts, together with the combination of S&T papers issued and S&T publications, are given 11.1% equally, because the first two represent indicators of R&D and innovation resource integration separately, and the last two together comprise the indicator of research publication. Consequently, 5.6% is given to the last two. Similarly, the third dimension is divided into three variables, with major S&T research achievements receiving 16.7% weight and patent applications and patents in force each given 8.3%, as they belong to the same aspect of intellectual assets. Table 6.1 presents the index of innovation, including its dimensions, variables and their weights, as explained.

In terms of the scale of variables, data are standardised and consistently scored with values between 0 to 100, in which 0 represents the lowest level, while 100 is the highest and most favourable level. The reason for applying this scale instead of a range from 0 to 1 is because it makes comparison easier and the presentation of data more straightforward, rather than struggling with decimals during analysis. The reason for using 0 to 100 instead of minimum to maximum is because different variables have different ranges from minimum to maximum. Variables must be standardised if they are required to be aggregated into an overall index. The calculation of the index score follows the procedure in formula 6.1. First, the minimum and maximum values of original data are identified, and their distance is calculated. Second, the statistics to be scaled have the minimum value subtracted, and are then divided by the distance between the minimum and the maximum. Finally, the outcomes are multiplied by 100, as the final results are in the range from 0 to 100. The calculation process can be expressed as follows:

$$\mathrm{Score}_i = \frac{X_i - X_{min}}{X_{max} - X_{min}} * 100 \qquad [6.1]$$

Where *i* is industry and *X* is the variable.

The aggregation of data within each dimension applies a weighted arithmetic mean of the variables, while the aggregation of dimensions at a higher level is performed by using a weighted geometric mean. This method is chosen due to the following benefits, as mentioned by Muñoz-de-Bustillo et al. (2011), who adopted a similar approach to calculating the index. First, it allows the consistency of the variation between a dimension and the overall index to be shown in the same scale. Second, it enables the contribution of dimensions to the index to be decreasing rather than linear. In this sense, the rise of the overall index, based on the increase in a certain dimension, will becoming decreasingly significant. Consequently, this leads to the third benefit: a higher value is achieved with a more balanced combination of dimensions, while a lower value is given to extreme cases where both very high and very low values exist (Muñoz-de-Bustillo et al., 2011). The calculation of the index using weighted geometric means follows the formula below:

$$\text{Value of Index} = \sqrt[\sum w]{D1^{w_1} \bullet D2^{w_2} \bullet \cdots \bullet Dj^{w_j}} \qquad [6.2]$$

Where j is the dimension, D is the value of the dimension, and w_j is the weight given to each dimension.

Table 6.1 Innovation index framework

Dimensions	**Indicators**	**Variables**
1. Innovation inputs (33.3%)	Innovation expenditure	Internal R&D spending (IRS) (11.1%);
	Human resources	R&D personnel rate (RPR) (11.1%);
	Facilities	R&D institutions (RI) (11.1%);
2. Research and technology collaboration (33.3%)	Research and development	R&D projects (RP) (11.1%);
	Research publication	S&T papers issued (SPI) (5.6%); S&T publications (SP) (5.6%);
	Technology collaboration	Imported technology contracts (ITC) (11.1%);
3. Innovation outputs (33.3%)	New products	Major S&T research achievements (MSRA) (16.7%);
	Intellectual assets	Patent applications (PA) (8.3%);

		Patents in force (PF) (8.3%).

Source: *China Science and Technology Statistical Yearbook, 2015.*

Each variable is explained further as follows:

1. According to the statistical yearbook (National Bureau of Statistics, 2015), internal R&D spending (IRS) includes: expenditures on basic research, applied research, experimental development; routine expenses; assets expenditure; government funds; self-raised funds by enterprises; foreign funds; and other funds. The unit of IRS given by the yearbook is 10,000 yuan (equivalent to USD 1,493). Its minimum value among industries is 80, while the maximum value is 11900347. The mean is 1203811. In order to discard the impact from industrial size, the real value of IRS is divided by the employment (number of people) in the industry. Thus, the final value of IRS becomes comparable.

2. R&D personnel rate (RPR) is calculated by the following formula:

$$\mathrm{RPR} = \frac{\text{R \& D personnel in the industry}}{\text{employed people in the industry}} \qquad [6.3]$$

It shows the proportion of R&D personnel in the industry. The unit of these two items of secondary data gathered from the yearbook – R&D personnel and employed people – is the number of people. Based on the calculation, the minimum RPR is 0.16, whilst the maximum RPR is 0.86, generating a gap of 0.7. The mean of RPR is 0.43.

3. The variable of R&D institutions (RI) indicates the number of R&D institutions in the industry. According to the yearbook, the average number of RI is 164. The maximum value of 1027 is found for the industry of scientific research and technical services, while the finance industry has the minimum value of 2. Again, to make the data comparable, they are divided

by the size of industry (number of people in the industry).

4. R&D projects (RP) shows the number of R&D projects an industry is conducting per year. According to the statistics, the minimum value is 10, in the wholesale and retail industry, while the maximum is 48888 in the scientific research and technical service industry. The average number is 4773. As the size of industries vary, this factor is considered during the calculation of RP.

5. S&T papers issued (SPI) indicates the number of S&T paper issued during the year. Similar to the situation of RP, it is dominated by the industry of scientific research and technical services, with maximum a of 75381, and the wholesale and retail industry receives the minimum value of 2. The industrial average SPI is 9381. Similar to the process mentioned above, the calculation of SPI involves dividing by the industry size in order to eliminate its influence.

6. S&T publications (SP) indicates the number of publications in the industries that are relevant to science and technology. Again, the maximum number of SP occurs in the scientific research and technical services industry (2467). In contrast, finance, and wholesale and retail, have zero publications during the year 2014. The mean of SP is 265. The calculation of SP also considers the industry size.

7. Imported technology contracts (ITC) provides the only data that are available at industry level, showing the technological innovation collaboration in China. The minimum value of ITC is 0 in the culture, sports and entertainment industry, and the maximum value is 6083, in manufacturing industry. The industrial average is 519. The real value of ITC must be divided by the size of the industry, so as to avoid its impact on the

value.

8. Major S&T research achievements (MSRA) is regarded as the indicator that shows the result of innovation. It is adopted as a substitute for new product, due to the absence of relevant data at industry level. As this research focuses on technological innovation, it is reasonable to accept MSRA as the variable in the dimension of innovation outputs. The minimum value of MSRA is 108 and the maximum value is 11241, where the mean is 3267. The size of industry is also considered when calculating MSRA.

9. Patent applications (PA) shows the number of patents applied for during the year, which is also an indication of innovation outputs. According to the data, finance and education perform poorly, with 0 PA, while manufacturing has the highest figure of 20747. The average number of PA is 2419. Again, the original value of PA needs to be divided by industrial size in order to make a comparison.

10. Patents in force (PF) indicates the number of patents that have been used in the industry. The minimum value of PF is 0, found in industries that include wholesale and retail, finance, and education; whilst the maximum value is 26474, from manufacturing. The mean of PF is 3789. The real value of PF also needs to be divided by industrial size before being scaled.

Table 6.2 summarises the adjusted innovation statistics, in which the original values are divided by the size of industry. The actual variables that are comparable are therefore achieved. This table shows the minimum, maximum, mean and standard deviation of the innovation variables before being scaled. It is remarkable that the standard deviation of IRS (internal R&D spending) is huge compared to the others. This is due to the big variations among different industries in China with regard to internal R&D spending, and the huge amount of investment. For instance, the maximum value of 12125.833 comes from the scientific research and technical services industry, which makes a substantial investment in scientific research, while the minimum value of 0.090 internal R&D spending per standardised industrial unit is found in the wholesale and retail industry, which less relies on research and development.

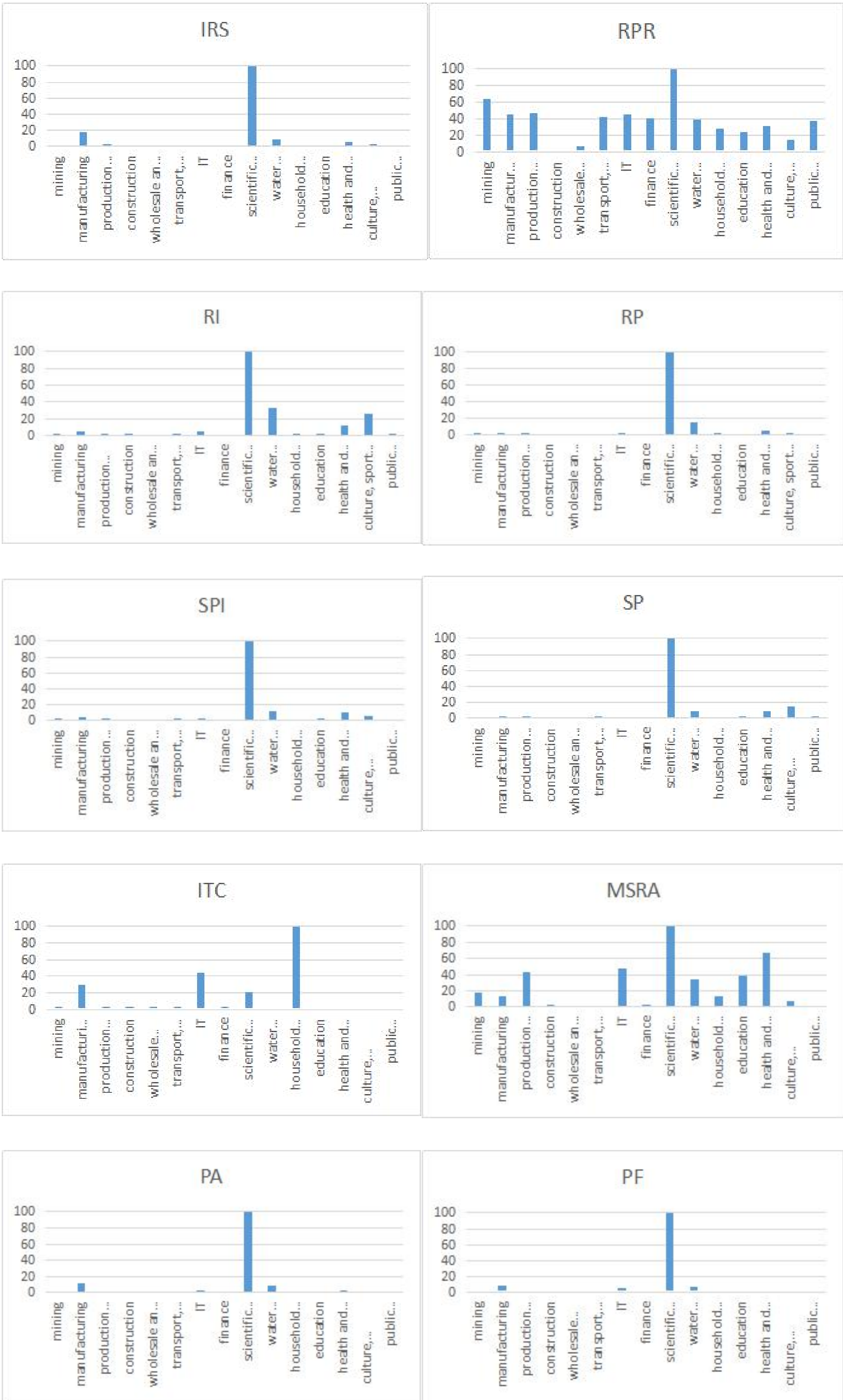
Table 6.2 Summary of descriptive statistics for innovation variables

Innovation variable	N	Minimum	Maximum	Mean	Std. Deviation
IRS	15	0.090	12125.833	1139.539	3100.556
RPR	15	0.160	0.860	0.425	0.168
RI	15	0.003	2.517	0.317	0.657
RP	15	0.011	119.824	10.600	30.579
SPI	15	0.002	184.757	16.750	46.975
SP	15	0.000	6.047	0.567	1.539
ITC	15	0.000	3.939	0.548	1.075
MSRA	15	0.122	15.208	4.150	4.304
PA	15	0.000	33.098	2.797	8.461
PF	15	0.000	64.005	5.327	16.324

Source: author's analysis from *China Science and Technology Statistical Yearbook, 2015*.

Figure 6.1 shows the scores of the innovation variables in different industries after being scaled. According to the figure, most variables feature several industries commonly staying close to the minimum values, except for some industries, especially the scientific research and technical services, receiving the highest score in most variables. Exceptions occur in the cases of RPR and MSRA, where variations in scores are apparent. The reason why scientific research and technical services receive higher scores is not difficult to understand, as this industry involves more scientific activities that are related to technological innovation.

Figure 6.1 Scores of innovation variables for Chinese industries



With scores of innovation variables, the scaled values of innovation dimensions can therefore be achieved through calculation of their weighted arithmetic means. Based on the results, the final values of the innovation index can be obtained by calculating the weighted geometric mean. Table 6.3 presents the scores of the innovation dimensions in different industries, as well as their final innovation index values.

Table 6.3 Scores of innovation dimensions and innovation index in Chinese industries

Industry	**Innovation dimensions**			**Innovation Index**
	D1	**D2**	**D3**	
Scientific research and technical services	100	73.7	100	90.3
Information transfer, software and IT services	17.8	16.0	25.8	19.4
Water conservancy, environment and public facilities	26.7	8.9	20.7	17.0
Manufacturing	23.0	11.0	11.7	14.3
Health and social services	16.1	4.7	34.1	13.7
Household services	10.5	34.1	6.5	13.2
Production and distribution of electricity, gas and water	16.3	1.8	22.1	8.6
Culture, sports and entertainment	14.3	4.5	3.6	6.1
Mining	21.7	1.1	9.0	6.0
Education	8.4	0.4	19.3	4.0
Public administration and social security	13.1	0.8	1.0	2.2
Finance	13.8	0.4	1.1	1.8
Transport, storage and post	14.7	0.9	0.2	1.4
Construction	0.2	0.5	1.6	0.5
Wholesale and retail	2.4	1.2	0.0	0.2

*D1, D2, D3 stand for innovation dimensions 1, 2, 3 respectively.

According to the outputs, the scientific research and technical services industry has the highest level of innovation among the industries investigated, with an overall score of 90.3, followed by the industry of information transfer, software and IT services (19.4), and then the water conservancy, environment and public facilities industry (17.0). The manufacturing, health and social services, and household services industries receive scores of 14.3, 13.7 and 13.2 respectively. In contrast, the other industries commonly receive scores lower than 10. The final score of wholesale and retail is 0.2, indicating it to be the least innovative industry. Similarly, industries such as construction; transport, storage and post; and finance have relatively lower levels of innovation compared to others.

6.2.2 Index of job quality

The index of job quality (see Table 6.4) is established based on the analytical framework of job quality. Compared to the framework in Chapter 5, the index in Table 6.4 lacks the dimension of autonomy and social dialogue, because relevant data are missing at industry level in China. Therefore, the index of job quality consists of four dimensions, with each receiving the same weight of 25%. Again, due to the absence of data, some indicators in the original framework cannot be included in the index. Consequently, it is a best fit categorisation driven by data availability. The dimension of earnings and benefits from job is reflected by average wage per year (25% weights), and the dimension of working hours and work-life balance is presented by weekly working hours (25% weights). The third dimension of safety, security and equality contains variables of employment ratio, employment gap ratio and working hours gap ratio, which address security and equality. Employment ratio receives half the weight (12.5%) of the dimension, while the ratios of the two gaps gain 6.25% each, together they indicate the aspect of equality. Finally, the skills and development dimension is presented by educational attainment (25% weights), which concerns the qualification of workers.

The calculation of the scores of job quality variables is mostly similar to the process explained in the innovation index section. However, three variables are exceptional because they are negatively related to job quality, which means the higher the value, the lower the job quality. These are weekly working hours, ratio of employment gap between men and women, and ratio of working hours gap between men and women; long weekly working hours indicate the problem of overtime work, which is regarded as low job quality; a big ratio of employment gap between men and women, as well as a big ratio of working hours gap between men and women, reflect a low level of fair treatment and equality, thus being low job quality. Therefore, another formula is applied to these variables, in which a high value receives a low score, and vice versa. Nevertheless, the scores remain between 0 to 100. Consequently, the outputs still follow the same understanding mentioned earlier, where 100 indicates the most desirable outcome while 0 stands for the least desirable condition, thus making them consistent and allowing for aggregation. This formula is shown as follows:

$$\mathrm{Score}_i = \left|\frac{Y_i - Y_{max}}{Y_{max} - Y_{min}}\right| * 100 \qquad [6.4]$$

Where *i* is industry, *Y* is negative variables such as weekly working hours, ratio of employment gap between men and women, and ratios of working hours gap between men and women.

Similar to the index of innovation, the aggregation of variables within each dimension is calculated through the weighted arithmetic mean, while the aggregation of dimensions into the job quality index is achieved through the weighted geometric mean.

Table 6.4 Job quality index framework

<table>
<tr><th>Dimensions</th><th>Indicators</th><th>Variables</th></tr>
<tr><td>1. Earnings and benefits from job (25%)</td><td>Wage and non-wage benefits</td><td>Average wage (AW) (25%);</td></tr>
<tr><td>2. Working hours and work-life balance (25%)</td><td>Working hours</td><td>Weekly working hours (WWH) (25%);</td></tr>
<tr><td rowspan="2">3. Safety, security and equality (25%)</td><td>Security of work</td><td>Employment ratio(ER) (12.5%);</td></tr>
<tr><td>Fair treatment and equality</td><td>Ratio of employment gap between men and women (REG) (6.25%);
Ratio of working hours gap between men and women (RWHG) (6.25%);</td></tr>
<tr><td>4. Skills and development (25%)</td><td>Education level of worker</td><td>Educational attainment (EA) (25%)</td></tr>
</table>

Source: *China Labour Statistical Yearbook, 2015.*

1. Average wage (AW) indicates the average level of annual wage within the industry, presented in Chinese yuan in the yearbook. According to the statistics, the minimum average wage is 39,198 yuan (equivalent to USD 5,852) in the industry of water conservancy, environment and public facilities, while the maximum average wage is 108,273 yuan (equivalent to USD 16,165) in the finance industry. The mean value of average wage is 64,082 yuan (equivalent to USD 9,567).

2. Weekly working hours (WWH) shows the average length of time spent working in a week. The data shows that the minimum value is 41.9 hours in the public administration and social security industry, and the maximum value is 50.5 hours in the wholesale and retail industry. The average industrial level is 45.9 hours. As weekly working hours is negatively related to job quality, where a higher value indicates lower job quality, the calculation of its score applies formula 6.4 as explained previously.

3. The employment ratio (ER) is obtained through the formula below:

$$\text{ER} = \frac{\text{employment in the industry}}{\text{total employment}} \qquad [6.5]$$

ER is calculated in order to present the situation of employment in a certain industry in comparison with the whole. According to the outputs, the average ER is 0.061 (equivalent to 6.1%). The minimum value is 0.004 (equivalent to 0.4%) and the maximum value is 0.287 (equivalent to 28.7%).

4. The ratio of employment gap between men and women (REG) is achieved through the following process:

$$\text{REG} = \frac{|\,\text{male employment} - \text{female employment}\,|}{\text{employment}} \qquad [6.6]$$

The reason for not simply adopting the absolute employment gap between men and women is because the figure of a gap cannot reflect the difference between males and females appropriately, as it may be affected by the size of the industry. For example, supposing the employments of industries A and B are 10 and 100 respectively, and the employment gaps between male and female are 2 in industry A and 4 in industry B. Although industry B has a larger gap than A in absolute terms, the difference is less significant in B when compared with the total. The ratio of employment gap in A is 0.2 (20%), while that in B is only 0.04 (4%). Consequently, it cannot be concluded that industry B has higher employment inequality between genders according to the absolute value. Therefore, the ratio of employment gap (REG) is introduced in order to avoid the impact of industry size and to better present the situation. According to the result, the minimum REG is 0.013 (equivalent to 1.3%), and the maximum REG is 0.783 (equivalent to 78.3%). The mean value is 0.290 (equivalent to 29%). As job quality is higher when there is less inequality of employment between genders, the calculation of REG scores adopts formula 6.4.

5. The ratio of working hours gap between men and women (RWHG) is

achieved through a similar process.

$$\text{RWHG} = \frac{|\,\text{male weekly working hours - female weekly working hours}\,|}{\text{weekly working hours}} \qquad [6.7]$$

Following the same logic and purpose stated above, the ratio of working hours gap between men and women (RWHG) is chosen to reflect the degree of working hours gap between genders in each industry. The calculation shows that the average value of RWHG is 0.029 (equivalent to 2.9%). The minimum value is 0.002 (equivalent to 0.2%) in the finance industry, and the maximum value is 0.085 (equivalent to 8.5%) in both the mining industry and transport, storage and post industry. The RWHG scores are also achieved through formula 6.4, because it is negatively related to job quality.

6. The variable of educational attainment (EA) shows the educational level of employees in the industry. By taking the corresponding years of education into consideration, multiplied by its proportion, the overall educational level of employees in the industry can be obtained through summation (see formula 6.8). Because people can receive a total of 19 years of schooling in China, the figure is between 0 to 19, in which a higher value indicates a higher level of educational attainment in the industry.

$$\text{EA} = \sum \text{score} * \text{percentage} \qquad [6.8]$$

Table 6.5 Scores of educational attainment

Educational attainment	Years of education
Illiterate	0
Primary school	6
Junior school	9
Senior school	12
College	15
Undergraduate	16
Postgraduate	19

According to the result, the average EA is 11.9. The minimum value is 9.4 in the construction industry, while the maximum value is 14.1 in the education industry. The final scores of EA are then obtained through formula 6.1, as EA is positively related to job quality.

The table below presents the descriptive statistics of job quality variables before being scaled. The big value of standard deviation regarding average wage can be accepted because it shows the big variations among Chinese industries in terms of wage, and the figures are large compared to other job quality variables, especially those ratios such as employment ratio (ER), ratio of employment gap between men and women (REG) and ratio of working hours gap between men and women (RWHG).

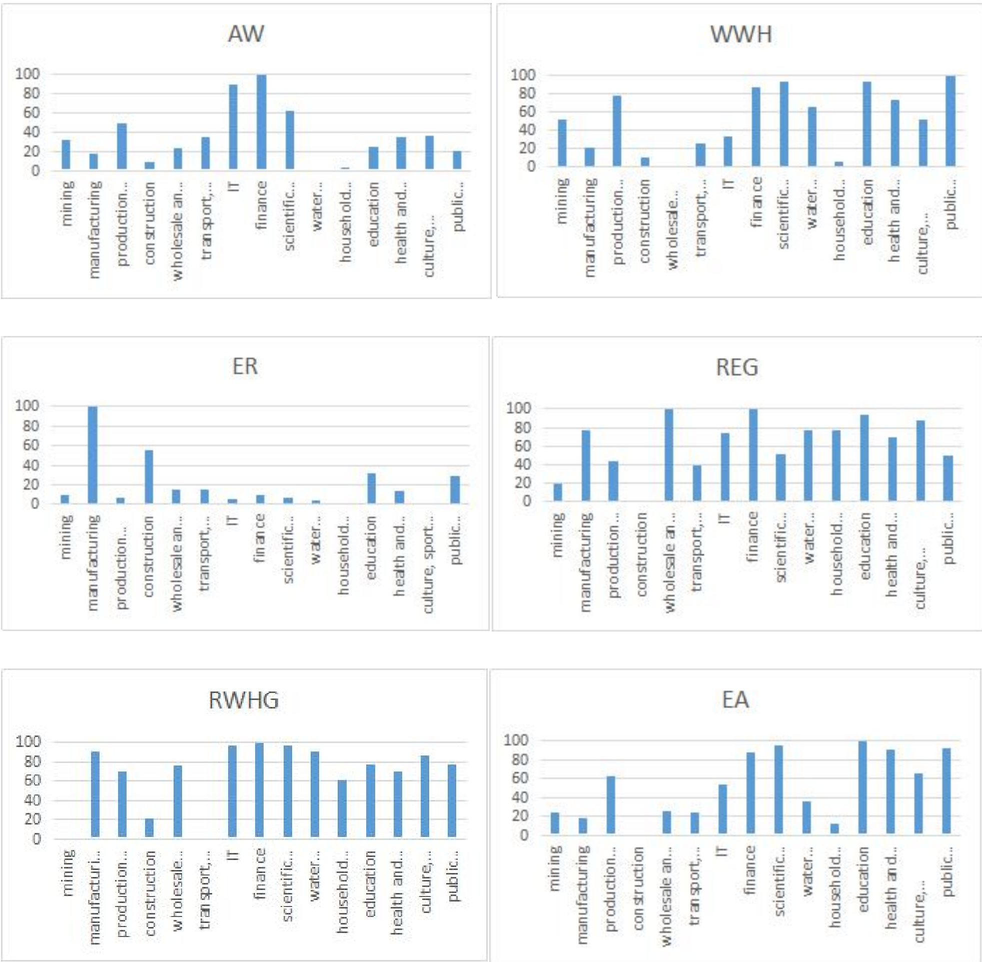
Table 6.6 Summary of descriptive statistics for job quality variables

Job quality variable	N	Minimum	Maximum	Mean	Std. Deviation
AW	15	39198.000	108273.000	64082.133	19963.937
WWH	15	41.900	50.500	45.920	3.006
ER	15	0.004	0.287	0.061	0.075
REG	15	0.013	0.783	0.290	0.226
RWHG	15	0.002	0.085	0.029	0.028
EA	15	9.406	14.145	11.905	1.643

Source: author's analysis from *China Labour Statistical Yearbook, 2015.*

Figure 6.2 shows the scaled scores of job quality variables in different industries. According to the figure, there are variations of different job quality attributes between industries. Some industries have high scores in certain variables, while other industries score well in others. For instance, the finance industry has high scores in almost every aspect of job quality except the employment ratio (ER). The industry of manufacturing is characterised by low scores in most variables, but receives high scores for employment ratio (ER) and ratio of working hours gap between men and women (RWHG). Such differences and variations between job quality attributes lead to difficulties in analysis, a problem not uncommon in the analysis of job quality (Muñoz-de-Bustillo et al., 2011). Therefore, the aggregation of variables can overcome this difficulty by achieving a balanced overall index that objectively reflects the level of job quality.

Figure 6.2 Scores of job quality variables for Chinese industries



Similar to the process of calculating the innovation index, the final scores for the job quality index are achieved by firstly acquiring the score of each dimension through the weighted arithmetic mean, and then transferring the values of dimensions into the job quality index through the weighted geometric mean. The scores of the job quality dimensions and job quality index are shown in Table 6.7.

Table 6.7 Scores of job quality dimensions and job quality index in Chinese industries

Industry	Job quality dimensions				Job Quality Index
	D1	D2	D3	D4	
Finance	100.0	88.4	54.7	87.8	80.7
Scientific research and technical services	62.3	94.2	40.0	96.0	68.9
Education	25.2	94.2	59.0	100.0	61.1
Health and social services	34.8	74.4	41.9	90.8	56.1
Public administration and social security	20.1	100.0	46.5	92.5	54.2
Production and distribution of electricity, gas and water	49.4	79.1	31.7	63.1	52.9
Information transfer, software and IT services	89.2	33.7	45.4	53.3	52.0
Culture, sports and entertainment	36.4	52.3	44.4	65.8	48.6
Manufacturing	17.6	20.9	91.8	18.1	28.0
Mining	32.5	52.3	10.1	24.8	25.5
Transport, storage and post	35.1	26.7	17.5	24.1	25.1
Household services	3.9	5.8	34.6	12.9	10.0
Water conservancy, environment and public facilities	0.0	66.3	44.0	36.2	0.0
Wholesale and retail	24.1	0.0	51.9	25.8	0.0
Construction	9.6	10.5	33.0	0.0	0.0

*D1, D2, D3, D4 stand for job quality dimensions 1, 2, 3, 4 respectively.

According to the results, the finance industry receives the highest score of 80.7, while construction; wholesale and retail; and water conservancy, environment and public facilities score 0.0, indicating a low level of job quality. The reasons for such distinction are that the former has high and well-balanced scores for its job quality diemsions, while the latter have low and very unbalanced scores, characterised by extremely low scores of job quality in certain dimensions. In comparison, Scientific research and technical services; education; health and social services; public administration and social security; production and distribution of electricity, gas and water; and information transfer software and IT services have relatively high levels of job quality, being scored over 50.

6.3 Creating the matrix

With the data of the innovation index and job quality index, the four-quadrant matrix indicating the different configurations between innovation and job quality in Chinese industries can therefore be generated. The classification of industries according to level of innovation and job quality is based on the industrial average, in which an index higher than the average value is categorised as high level, while a lower-than-average score is labelled low level. Table 6.8 and Table 6.9 show the index of innovation and job quality in all the industries investigated, including the average level, and identifies their levels of innovation and job quality accordingly.

Table 6.8 Innovation index and innovation level of Chinese industries

Industry	Innovation Index	Innovation level
Scientific research and technical services	90.3	High
Information transfer, software and IT services	19.4	High
Water conservancy, environment and public facilities	17.0	High
Manufacturing	14.3	Low
Health and social services	13.7	Low
Household services	13.2	Low
Production and distribution of electricity, gas and water	8.6	Low
Culture, sports and entertainment	6.1	Low
Mining	6.0	Low
Education	4.0	Low
Public administration and social security	2.2	Low
Finance	1.8	Low
Transport, storage and post	1.4	Low
Construction	0.5	Low
Wholesale and retail	0.2	Low

Average level	**15.5**	**-**

Table 6.9 Job quality index and job quality level of Chinese industries

Industry	Job Quality Index	Job Quality level
Finance	80.7	High
Scientific research and technical services	68.9	High
Education	61.1	High
Health and social services	56.1	High
Public administration and social security	54.2	High
Production and distribution of electricity, gas and water	52.9	High
Information transfer, software and IT services	52.0	High
Culture, sports and entertainment	48.6	High
Manufacturing	28.0	Low
Mining	25.5	Low
Transport, storage and post	25.1	Low
Household services	10.0	Low
Water conservancy, environment and public facilities	0.0	Low
Wholesale and retail	0.0	Low
Construction	0.0	Low
Average level	**45.7**	**-**

It can be summarised that the industries with high innovation are scientific research and technical services; information transfer, software and IT services; and water conservancy, environment and public facilities. Industries with low innovation include wholesale and retail; construction; transport, storage and post; finance; public administration and social security; education; mining; culture, sports and entertainment; production and distribution of electricity, gas and water; household services; health and social services; and manufacturing. In terms of job quality, eight industries are defined as having high job quality, while seven industries have low job quality. The former include finance; scientific research and technical services; education; health and social services; public administration and social security; production and distribution of electricity, gas and water; information transfer, software and IT services; and culture, sports and entertainment. The latter are construction; wholesale and retail; water conservancy, environment and public facilities; household services; transport, storage and post; mining; and manufacturing.

Based on the above results, industries with different levels of innovation and job quality can be populated into the four quadrants below (see Figure 6.3). According to the matrix, the scientific research and technical services industry, and information transfer, software and IT services industry, have high levels of both innovation and job quality (H, H). The water conservancy, environment and public facilities industry is characterised by high innovation but low job quality (H, L). In contrast, six industries feature low innovation and high job quality (L, H), namely finance; education; health and social services; public administration and social security; production and distribution of electricity, gas and water; and culture, sports and entertainment. Moreover, the other industries fall into the type of low innovation and low job quality (L, L). These are construction; wholesale and retail; transport, storage and post; household services; mining; and manufacturing.

Figure 6.3 Configurations between innovation and job quality in Chinese industries

High innovation, high job quality (H, H)	**High innovation, low job quality (H, L)**
Scientific research and technical services; Information transfer, software and IT services.	Water conservancy, environment and public facilities.
Low innovation, high job quality (L, H)	**Low innovation, low job quality (L, L)**
Finance; Education; Health and social services; Public administration and social security;	Wholesale and retail; Construction; Transport, storage and post; Household services; Mining;

Production and distribution of electricity, gas and water; Culture, sports and entertainment.	Manufacturing.

6.4 Selecting the industry case studies

The analysis above has identified four types of industries in terms of different levels of innovation and job quality. Among the 15 industries investigated, 2 industries are labelled with high innovation and high job quality, while only 1 industry is categorised as having high innovation but low job quality. In addition, the type of low innovation, high job quality and low innovation, low job quality are each associated with 6 industries. According to the research design, the qualitative research will focus on 8 companies in Shanghai, including both state-owned enterprises and private enterprises. Therefore, one industry needs to be selected from each category of innovation and job quality. Within each industry, one state-owned enterprise and one private enterprise will be interviewed. As the statistical analysis is based on medium and large-sized enterprises, the companies chosen for interview will also be medium and large-sized enterprises.

In the quadrant of high innovation, high job quality (H, H), the industry of scientific research and technical services is chosen. The reason is firstly because it has higher scores in the innovation index and job quality index than the industry of information transfer, software and IT services. The second reason is due to its higher employment. In 2015, the employment total in the scientific research and technical services industry is 4,106,000, while the figure of the information transfer, software and IT services industry is 3,499,000 (National Bureau of Statistics of China, 2016). Therefore, this research will focus on the industry with larger size.

As only one industry is included in the quadrant of high innovation, low job quality (H, L), this research will interview one state-owned enterprise and one private enterprise in the industry of water conservancy, environment and public facilities.

In terms of the low innovation, high job quality (L, H) quadrant, finance, education, and public administration and social security have relatively higher employment (above 300,000) in recent years than the other industries listed. In the results from statistical analysis, finance receives lower scores in the innovation index but higher scores in the job quality index than the other industries in the same quadrant. Therefore, finance is typical in both Shanghai and in this research, as an industry with low innovation but high job quality. Therefore, this industry is chosen for interview.

With regard to the quadrant of low innovation, low job quality (L, L), manufacturing, wholesale and retail, and construction are the top three industries where most people are employed. According to the *Shanghai Statistical Yearbook* (2016), manufacturing enjoys the largest industry size, with around 3,510,300 employed people in 2015. The industry of wholesale and retail is ranked the second among all the industries in the quadrant of low innovation and low job quality, with 2,383,100 employees in 2015. In the same year, 1,083,300 people worked in the construction industry. The statistical analysis shows that wholesale and retail receives the lowest score in terms of both the innovation index and job quality index. Therefore, it is most suitable to choose wholesale and retail as the industry with low levels of innovation and job quality in Shanghai.

In summary, four industries have been selected (see Figure 6.4): scientific research and technical services; water conservancy, environment and public facilities; finance; and wholesale and retail; these industries respectively represent different types of Chinese industries in terms of levels of innovation and job quality.

Figure 6.4 Selection of case study industries

High innovation, high job quality (H, H)	High innovation, low job quality (H, L)
Scientific research and technical services	Water conservancy, environment and public facilities
Low innovation, high job quality (L, H)	**Low innovation, low job quality (L, L)**
Finance	Wholesale and retail

6.5 Conclusion

This chapter has conducted a statistical analysis of 15 industries in China, in order to achieve the research objective of identifying the current state of innovation and job quality in China, in terms of levels of innovation and job quality across Chinese industries. Based on the analytical framework established in Chapter 5, as well as the availability of relevant data, ten innovation variables and six job quality variables are calculated and then aggregated into an index of innovation and index of job quality respectively. According to the results, most industries investigated have low levels of technological innovation, except: the scientific research and technical services industry; information transfer, software and IT services industry; and water conservancy, environment and public facilities industry. This finding is unsurprising because they are more related to technology. One extreme case is scientific research and technical services, which receives the highest score prominently in almost every innovation variable, except imported technology contracts. As this industry involves enormous science and technology research activities, its innovation level is the highest among all the industries analysed, as proven by this statistical analysis. In terms of job quality, more than half of the industries have a high level of job quality, characterised by industries such as finance, scientific research and technical services, and education. The result indicates that higher job quality tends to occur in capital-intensive industry and technology-intensive industry, while lower job quality is more likely to happen in labour-intensive industry, such as construction, household services, and manufacturing.

According to the final result of the configurations between innovation and job quality, there are variations among Chinese industries. With different characteristics of innovation and job quality level, it is important to discover why this difference exists. Therefore, the following research will investigate four types of industries in Shanghai, and will explore the relationship between innovation and job quality in different industries (i.e. scientific research and technical services; water conservancy, environment and public facilities; finance; and wholesale and retail) through interviews.

Chapter 7. Enterprise-level analysis

The previous chapter provided a statistical analysis of the macro data for innovation and job quality in China, and drew a four-quadrant matrix populated by industries with different levels of innovation and job quality. By conducting interviews in the four industries selected at the end of last chapter and applying methods and techniques presented earlier in the research design, this chapter discusses the findings of interviews in China from the enterprise-level case studies of industries in that matrix.

In this chapter, four industries in Shanghai were investigated, namely: scientific research and technical services; water conservancy, environment and public facilities; finance; and wholesale and retail. According to statistical analysis, the four industries chosen represent different levels of innovation and job quality, including high innovation, high job quality; high innovation, low job quality; low innovation, high job quality; and low innovation, low job quality. Within each industry, one state-owned enterprise and one private enterprise were involved, as circumstances of innovation and job quality might differ between different types of enterprises (see Table 7.1 for case study enterprises). Furthermore, two participants with different hierarchical positions were interviewed in each enterprise to acquire more insights and avoid bias. Generally, one manager and one ordinary employee who are familiar with innovation and job quality in their company were interviewed. However, the participants varied in some cases due to different circumstances. In total, 16 participants from 8 enterprises in 4 industries in Shanghai were interviewed.

The following discussion presents the findings by industry. In each industry, the basic information of interviewed enterprises is firstly introduced, and then three themes are discussed: innovation, job quality, and the relationship between innovation and job quality. In addition, comparisons among industries, as well as of different types of enterprises, are also made during the discussion. The later section analyses the key findings concerning the overall situations of innovation, job quality, and their relationship discovered in the interviews, as well as some comparisons with statistical analysis. Finally, a theoretical model is generated for a better understanding of the relationship between innovation and job quality in China.

Table 7.1 Case study enterprises

Enterprise	Enterprise type	Industry
S1	State-owned	Scientific research and technical services
S2	Private	
WE1	State-owned	Water conservancy, environment and public facilities
WE2	Private	
F1	State-owned	Finance
F2	Private	
WR1	State-owned	Wholesale and retail
WR2	Private	

7.1 The scientific research and technical services industry

7.1.1 Introduction of the enterprises

The state-owned enterprise (S1) interviewed is a branch of a national organisation aimed at exploring high technology and natural sciences, with a comprehensive research and development network, a merit-based learning society and system of higher education. The organisation brings together scientists and engineers to address both theoretical and applied problems by using world-class scientific and management approaches. It has 13 branches and 104 affiliated research institutes. Located in Shanghai, the branch interviewed is in charge of the local institutes in Shanghai, Zhejiang and Fujian. It has more than 10,000 regular staff, out of which over 80% are professional personnel. The Shanghai branch holds various responsibilities, including fostering institutional directors; organising scientific and technological cooperation between the organisation and local governments; coordinating regional innovative efforts; supervising, auditing, and liaising with Shanghai-based organisation's academicians; postgraduate education; and other locality-based affairs. Among the various fields it researches, priority is given to disciplines such as IT, alternative energy, new materials, space and ocean science, public health, and mega-science engineering. The two respondents interviewed include one chief engineer in the technology transfer centre and one employee in the science and technology cooperation department. The chief engineer initially joined this organisation in 2007 and specialised in solar energy and new energy research, with a PhD background. Later on, as he gradually became involved in local cooperation, he became a deputy mayor in a nearby city for two years; he has now returned to this organisation in Shanghai in his second year. He is a highly experienced professional in this field. The other respondent has worked in this Shanghai branch for three years, with previous work experience in the same system of university-industry cooperation.

The private enterprise (S2) interviewed offers professional consultancy services for high-tech enterprises and research institutions in Shanghai, in aspects of science and technology policy guidance, project planning, project application, project acceptance and entrepreneurial finance. By providing suggestions on technology tax and government subsidies, it helps clients achieve innovative, continuous and rapid developments in cost-effective ways. Having established long-term cooperation with various science parks and universities in Shanghai, and achieved relevant qualification certificates, the enterprise aims to build a platform for integrating industry, universities and research. By 2017, it had serviced over 2,000 enterprises. Compared to the state-owned enterprises, the private enterprises in the scientific research and technical services industry are commonly small in China. The enterprise interviewed has around 50 employees and consists of a business department, project department, finance department and administration department. The CEO of the enterprise and one employee working in the business department were interviewed. The CEO established the enterprise in 2011; and the employee has worked for the enterprise since 2012, whose task is to extend business, to deliver training for enterprise clients at the science park and incubator, and to help the project department apply projects.

7.1.2 Innovation in the enterprises

The *Oslo Manual* defines four types of innovation, namely product innovation, process innovation, marketing innovation, and organisational innovation; in which product and process innovations are regarded as technological innovations, while marketing and organisational innovations are non-technological innovations. When asked about innovation, the participants in the state-owned enterprise mentioned innovations in technology transfer and organisation, while the private enterprise stressed its innovation in service, which belongs to product innovation in the four types defined. In the state-owned enterprise, the technology transfer centre used to focus on transferring a single project to produce a single product, but now has changed to engage in the broad fields based on its core technology, and to generate industrial clusters. As the chief engineer (S1) noted:

... for example, we have a technology of making glass. In the past, we

transferred the technology to a firm producing drinking glasses. But now, we attract external resources onto the big platform of glass products production, which means we not only produce drinking glasses, but also make other glass products, thus developing the whole field of glass rather than creating one product. This is called the "new method".

Therefore, the new method introduced in technology transfer in S1 enables it to achieve cooperation with more enterprises, and to transfer its technologies into a wide variety of products; this innovation stimulates efficiency and productivity.

Another kind of innovation is also occurring in S1, known as the "new mode". Previously, technology transfers were mainly conducted by internal staff in S1. Now, this has changed to include three different groups of people: the internal staff in S1, people working in the government, and people doing business consultancy in the market. The new mode is innovative because it brings together S1, the government, and business (triple helix) as one team to accomplish the common goals of the industrialisation of scientific achievements; in which S1 is in charge of technology resources, the government is familiar with policy and demand from local industries, and the commercial institutions possess substantial enterprise resources and are familiar with market demand. The advantages of different groups bring benefits to technology transfers. Moreover, as the chief engineer added, *"it is a non-profit organisation that purely aims at pushing technologies into the market, and people don't worry about monopoly or profit differentiation during the process"* (S1).

As a private enterprise (S2) providing services for high-tech enterprises, innovations happen in the platform and service it provides to its customers. On the one hand, an online platform has been developed to offer help in technology issues: it links client customers who have technology problems to the scientists and experts who are professionals in the particular fields. By posting needs first and matching with professionals later on, the clients reach technology research and development cooperation with experts through the form of bidding. The platform is innovative because it provides easy access to enterprise-university cooperation in the market, and allows it to work in a more effective way by acting as an agent.

On the other hand, the private enterprise has also changed the form of the service it delivers to its client enterprises, in terms of training in government policy, project application and financial knowledge. In the past, it served clients individually. However, as the number of clients surged rapidly due to the popularity of entrepreneurship in China, it has now changed to deliver training for groups of clients at a time. By putting clients with the same interests together, it provides training regularly at science parks. *"We save time and resources for our clients through innovation in service"*, commented the employee from S2.

As innovation is specifically stressed in this industry, both enterprises consider their own conditions, and refine and implement the government policies accordingly. For example, in the past, the various research institutes in S1 were independent. But now, S1 has established some institutes that are combined and integrated in order to meet the national demand. Therefore, excellent talents in different research areas join to collaborate and increase achievements.

In summary, the two enterprises interviewed are similar in using a platform to achieve innovation, though S1 innovates in the platform of achieving technology transfer, while S2 acquires innovation through a platform of enterprise-university cooperation. The "platform" mentioned here refers to a place or channel where more clients are reached and various resources can be integrated. According to the discussion, platform innovation is important to both enterprises as it integrates a wide variety of resources to achieve upgrades in the business: for example, from one product to relevant products and industrial clusters (S1); and from individual problem-solving to networks of technology cooperation. Moreover, organisational innovation was mentioned by the state-owned enterprise (S1), which provides a signal for involving more participants from different fields.

7.1.3 Job quality in the enterprises

The interviewees reported good overall job quality in the two enterprises, though the state-owned enterprise has better conditions in some aspects such as earnings, autonomy and social dialogue. Interviewees were asked about the five dimensions in the job quality framework and job quality policies in the enterprises. First, regarding earnings and benefits from job, in accordance with the national standard, earnings from S1 consist of three parts, including basic wage, position wage, and performance wage. In S2, the earnings include basic wage and performance wage, in which the latter is more important, as rewards are mainly decided based on employees' achievements.

Second, in terms of working hours and work-life balance, differences exist between administrative staff and non-administrative staff in S1, as the former have fixed working hours on weekdays, whilst the latter have flexible arrangements that involve frequent overtime work according to needs of the project. In S2, the working hours are eight hours per day for five days per week, with little overtime work. The participants from both enterprises feel that their work and life are well-balanced.

Third, regarding the aspects of safety, security and equality, the overall safety is high in S1, though with a very low possibility of potential physical risk during research. The safety in S2 is good because no dangerous work is involved. Job security in both enterprises are high; although a certain degree of mobility is encouraged in the future, *"Because our country is encouraging innovation and supporting mobility to avoid fixed mindset which prevents innovation"*, as explained by the chief engineer (S1). In terms of the equality in the two enterprises, employees receive different levels of earnings, but they are based on the criteria of employees' capability and performance. Therefore, the treatment is relatively fair, as there is no discrimination across gender, age and department.

Fourth, in terms of skills and development, S1 features internal training such as in intellectual property, technology contracts and scientific achievement transfer, both on site and online, while S2 is characterised by external training in policy from the government. Relevant educational qualifications are required. For instance, the qualification for technology contracts and management must be obtained by those in charge of technology contracts in S1. The qualification of technology broker needs to be acquired in S2.

Fifth, concerning autonomy and social dialogue, this is reflected in two forms in the state-owned enterprise (S1), specifically the staff and workers' congress and the labour union. The staff and workers' congress is held to discuss big issues such as policies, especially those relating to employees' welfare and structural changes of wages. The labour union is in charge of organising activities for reporting situations in daily work. In S2, it holds meetings in the company and departments, in which employees can raise such issues, especially regarding their needs. Employees make decisions in their job, but need to discuss them with superiors when they are beyond their scope of work. In comparison, the state-owned enterprise has a more formal form of organisation (labour union) to guarantee employees' autonomy and social dialogue.

In terms of job quality policies, meeting employees' needs and improving their welfare are regarded to be important. From the leadership perspective, the CEO (S2) believed that the way to promote job quality is by listening to and satisfying employees. He pointed out that "*you need to walk into the crowd, to reach different treatment and to learn employees' demands ... if you want to improve their job quality, you have to meet distinctive job demands from them*" (S2). From the perspective of employees, they feel their job quality is improved through an annual improvement of treatment and wages, regular group dinners and holiday trips, and other small aspects of welfare, such as providing cold drinks during hot weather (S2). Furthermore, job quality can be increased by the government policies. For instance, the recent government policy of scientific achievements transfer enables the project team to enjoy a big share of the profits, which increases individual earnings; whereas the profit belonged to the nation in the past (S1).

7.1.4 Relationship between innovation and job quality

When investigating the relationship between innovation and job quality, the causality direction between them was explored. Thus, during the interviews, questions of innovation's impact on job quality and job quality's impact on innovation were asked separately. As a result, a two-directional relationship was found in both enterprises interviewed.

On the one hand, innovation has an influence on job quality in both enterprises. Job quality is affected by innovation through changes in different aspects, such as a firm's performance, productivity and public recognition. For example, the introduction of a new platform extends the business fields for the enterprise, thus improving its performance and profit. Therefore, the performance of employees also improves correspondingly, which leads to increased performance rewards, an important aspect of job quality. Another example is demonstrated by S2, which innovates in the way it delivers its services, as presented in section 7.1.1. With the new approach, service is provided more efficiently, and productivity is higher than before. As a result, regarding employees' job quality, their working hours improve and earnings increase as they can provide service for more clients in shorter period. Moreover, in the long term, the accumulation of innovation promotes public recognition, which helps the improvement of job quality. As the chief engineer (S1) noted:

Innovation needs a process of accumulation, from quantitative changes to qualitative breakthroughs. It is likely that others don't understand you at the beginning, but through accumulation you then make real achievements, and everyone will accept you. At that time, you will enjoy returns of increased earnings, social status and every aspect of your job, including promotion. However, it is a long-term process.

Consequently, different innovations have different impacts on job quality, and can change different aspects of job quality. In the industry of scientific research and technical services interviewed, earnings and working hours are the main aspects affected by innovation in the two enterprises.

On the other hand, job quality can influence innovation when innovation is encouraged. The encouragement of innovation within the organisation is an important prerequisite for discussing whether job quality has an impact on innovation, because employees prefer not to innovate when they are not required to, even if their job quality is improved. The employee in S1 explained that it depends on whether his leader pursues innovation. *"If my leader encourages innovation, I will be motivated to innovate. If not, I feel comfortable with my daily work",* the employee commented (S1). Due to the nature of the industry, innovation is important to the enterprises. Therefore, in an atmosphere that encourages innovation, better job quality motivates employees to be more innovative; thus, job quality affects innovation. Four aspects of job quality listed in the framework were said to be influential to innovation: earnings and benefits from job; safety, security and equality; skills and development; and autonomy and social dialogue. Furthermore, other related aspects such as promotion and recognition can also impact on innovation. The chief engineer quoted an old Chinese saying, "live and work in peace and contentment", indicating the importance of a well-paid and secure job. When people are provided with good conditions in their life and job, they are then able to concentrate on their career and generate innovation ideas. Otherwise, they have to worry about their livings and future first. Therefore, earnings and job security are essential to innovation. The CEO from the private enterprise (S2) interpreted it from the perspective of leader, in which wage is regarded to generate innovation because employees receive wages and work for the company. Apart from that, learning and autonomy can promote innovation because it enables employees to receive new things and to give suggestions, a process that encourages an open mind and coming up with new ideas. Moreover, innovation activities tend to be more dynamic among young employees who care about promotion, self-development and recognition in the enterprise. Therefore, improving these aspects can also help promote innovation in the enterprises.

To summarise, innovation and job quality interact with each other, which is achieved through different mechanisms. According to the interviews, a two-directional relationship between innovation and job quality exists both in the state-owned and the private enterprise in the scientific research and technical services industry. In comparison, innovation tends to have an indirect impact on job quality, while job quality has both a direct and indirect impact on innovation. The findings indicate that the occurrence of innovation often promotes employees' job quality indirectly through changes in different aspects, such as improved performance, productivity and public recognition. Conversely, a rise in job quality could promote innovation either directly or indirectly. However, a company culture that encourages innovation is important because employees can be motivated to innovate if they are encouraged. Otherwise, employees are reluctant to innovate if they are not required to, even though their treatments are improved. As claimed by the respondents in the interviews, where both their companies encourage innovation, the improvement of earnings and benefits from job, as well as safety, security and equality, could have direct positive impacts on innovation, while skills and development, as well as autonomy and social dialogue, could influence innovation indirectly, through increased acquisition of new knowledge and opening a channel for giving suggestions and new ideas, thereby increasing potential for innovation.

7.1.5 Summary

The industry of scientific research and technical services is innovative in terms of technological innovations, as well as non-technological innovations such as platform innovation and organisational structure innovation. Job quality in the industry is high, because all the dimensions in the framework of job quality were proved to be satisfactory in the two enterprises interviewed. In terms of the relationship between innovation and job quality, on the one hand, innovation affects earnings and working hours through improved performance and efficiency respectively. Innovation also benefits higher social status and promotion. On the other hand, when employees are encouraged to innovate, four dimensions in the job quality framework can promote innovation: these are earnings and benefits from job; safety, security and equality; skills and development; and autonomy and social dialogue. In addition, other factors including opportunity for promotion and self-development, and recognition within the enterprise, can also promote innovation. Government policies are important for innovation and job quality in this industry because it’s highly related to science and technology which has drawn great policy attention. Enterprises integrate resources to achieve innovation, and try to meet employees’ needs to improve different aspects of job quality.

7.2 The water conservancy, environment and public facilities industry

7.2.1 Introduction of the enterprises

The state-owned enterprise (WE1) investigated operates in the domestic refuse operation and disposal field. Its main business is the construction of anti-seepage engineering, and fly and odour treatment. The former aims to protect the environment of domestic waste landfill sites: in order to prevent the seepage of domestic waste from contaminating underground water, the company adopts engineering measures to block waste from underground water. The latter operation mainly deals with the control of flies and odour. For example, it applies chemicals at domestic waste landfill sites and uses microorganisms and botanical deodorants at refuse dumps.

In terms of the organisational structure, the enterprise has one office, two centres and six departments, including a Party and mass work department, human resources department, business security department, marketing department, accounting department, and science and technology information department. There are 64 formal employees in the enterprise, while temporary workers are outsourced by the enterprise during the conduction of projects, because projects are not available at all times. However, the core technicians are from within the enterprise, including project managers, technical engineering technicians, and documenters. In the future, the enterprise plans to extend its business to other fields such as contaminated soil repair, sewage treatment, and wet-waste equipment development. In order to achieve this, the enterprise has accumulated some experience in recent years through subject research, development of chemicals and equipment, and market research in relevant areas. One of the interviewees is the manager of the science and technology information department, and is also the deputy chief engineer. He joined this enterprise in 2005. His job involves three main tasks: 1) to solve production problems such as making products more environmentally friendly and reducing the price by lowering the cost; 2) to reserve technologies for the enterprise's future development fields; 3) to reserve technology, projects, energy and labs to pursue patents, which are an important indicator of high-tech enterprise. The other interviewee is the subordinate of the manager, with the position of senior supervisor in the department. She has been in the enterprise for nine years, and is in charge of research, internal control and daily management. According to her, the enterprise had labs for research in the past, but now frequently hands the research over to universities as it cooperates with universities.

The private enterprise (WE2) interviewed has its main business in environmental engineering, especially water treatment, with some products relating to environment protection, e.g. water treatment chemicals. It has broad clients from various industries, ranging from automotive painting, electronics, semiconductors, and steel, to new materials and new energy. The waste water in clients' factories is processed and recycled, and then returned to their system. Consequently, WE2 is a high-tech enterprise. There are around 50 people in WE2, with typical positions from top to bottom including chairman, deputy general managers, engineering directors, project managers, construction managers and technical workers. There is a project management department, procurement department, accounting department, and technology research and development department in WE2. As the Chinese government emphasises environmental protection, the enterprise has great opportunities to develop. In the future, it sets the goal of being professional in its industry, and switching its role from being a technology provider to a project general contractor. In the further future, it hopes to achieve more cooperation, to extend its business, and finally to be a listed company. However, it faces both internal and external challenges at present. The external challenges mainly arise from competition from the market and competitors, while the internal challenges are characterised by the difficulty of financing and scarcity of talents. In this research, the chairman and the procurement manager were interviewed. The reason for choosing managers in both enterprises is due to the special condition in the industry, in which the enterprises' offices are dominated by managerial people, as lower-level employees and workers (often outsourced) are on site across the country. Nevertheless, the research has interviewed people in different hierarchical positions in order to compare findings.

7.2.2 Innovation in the enterprises

Both technological innovation and non-technological innovation exist in the industry. However, technological innovation, specifically product innovation is dominant in the state-owned enterprise (WE1), while the private enterprise (WE2) shows both technological and non-technological innovations.

So far, WE1 has achieved technology advances in three areas, including fly treatment and deodorant, heavy-metal-contaminated soil repair and wet refuse disposal. First, regarding fly and odour treatment, on the one hand, WE1 has developed microbial deodorants to replace its previous botanical products. This took three years of research and development, during which cooperation was also conducted with universities. The new microbial deodorant products have been approved by the Shanghai Environmental Protection Bureau as being absolutely safe. Compared to botanical products, which can only reduce odour that has already emerged, the microbial deodorant has the advantages of continuously consuming the organics in the waste and preventing odour release. Therefore, the new products are more effective and perform better. The enterprise also keeps improving its deodorant products, and extended series with different functions. For example, there are separate deodorants for acid gas and alkaline gas, as the pollution of urban sewage consists of numerous acid gases, while alkaline gases such as ammonia gas are high at dung crossing and dejection transfer areas. Consequently, WE1 employs radical and incremental innovations in its technology. On the other hand, regarding fly control, the traditional approach is to use pesticides; this is effective in residential areas, but less so at refuse landfill, because flies breed and develop resistance to pesticides. To kill flies, pesticides need to have increased concentration, but this is harmful to humans and the environment. Therefore, two solutions have been adopted by WE1: one is to compound and improve pesticides while keeping them in low concentration; the other solution is to develop alternative sprays that are hypotoxic or nontoxic, which are ideal for indoor and office areas. When respondents were interviewed, WE1 was working on the research for the second solution, and was at the stage of toxicity tests.

Second, in terms of heavy-metal-contaminated soil repair, WE1 has developed and produced some chemicals for the solidification of heavy metals; these are low in cost and high in effectiveness. However, as the standard for contaminated soil has not yet been generated in China, the competition in the market is still chaotic. Third, regarding wet-refuse disposal, WE1 has conducted research on compost treatment and has generated a composting product which is stable, odourless, and the size of a coffee bean. It passed tests from the Shanghai Garden Institute, and is applicable in gardens.

In WE2, both technological innovation and organisational innovation exist. On the one hand, it achieves technological innovation, through cooperation with universities. It applies new research achievements into the market and verifies them. For example, before applying new technologies into its projects, it conducts experiments by using the lab and facilities from university first, and then runs tests at its clients' factories. After all the tests have been passed, the technology can thus be put into application. *"Even if it has been put into use, problems can still occur. Therefore, we keep improving",* added by the chairman of WE2. According to the discussion of technology innovation, it was discovered that a small change can make a big difference in this industry. For instance, after a series of experiments, a change of electrode material in the electro-catalysis device was found to be a great innovation for the industry, because it improves the efficiency of the device dramatically and solves problems which could not be tackled before. Thus, it becomes a patent and will be kept secretly in the market. The procurement manager mentioned that they introduce new projects, improve process, find new suppliers and use new channels according to the market demands. Consequently, it is clear that technological innovation is important in this industry.

On the other hand, organisational innovation has occurred in the management of WE2. First, the management structure of the enterprise is flat, which helps everyone in the enterprise to have timely communications. Due to the nature of the industry, where technology is key, the communication of technology and control of construction details are paramount, generating a continuous cycle of learning process. For example, employees may apply a technology to construction and find some problems. As a result, they improve the technology and reapply it in the construction, thus creating a virtuous cycle. Second, the wage system in WE2 has been changed. In the past, technical workers received a fixed wage each month, but now their wage is based on their performance, and consists of different components such as basic wage, position allowance, technology allowance, seniority pay and performance reward. The reason for such innovation is to motivate employees and to provide support for key performance indicators (KPIs). Third, by combining the new wage system with project managers and engineering directors, an independent system was generated, which is able to conduct projects individually. Consequently, based on the innovations in management stated above, project managers are capable of completing projects independently. As the chairman (WE2) commented: *"... manage people through system... we can say it is a delegation of power, but it must be based on a very strict management system to achieve that."*

Another organisational innovation in WE2 is its business cooperation with asset-heavy enterprises. As an asset-light enterprise offering technical services, WE2 does not have the problems of asset-heavy manufacturing enterprises which have pressure from overstock. However, the light assets prevent WE2 from growing fast, because the valuation of light assets is low. To solve this problem, the enterprise has cooperated with asset-heavy enterprises and attracted investments. It has also tried new projects, such as with the government and across industries.

There are innovation policies at both enterprise and government levels in the industry. From the perspective of government, favourable policies for high-tech enterprises are helpful to promote innovation; these include subsidies and tax deductions. Also, enterprises can use internal policies to promote innovation. For example, WE1 rewards those who have applied for a patent, completed a project, or provided reasonable advice. It has a policy named “special position, special salary”, which enables employees to receive extra rewards by the end of the year if they conduct more projects. WE2 includes a technology allowance within the wage system in order to encourage employees to innovate: if employees solve a problem during their work, it adds credit to their technology allowance, thus increasing their earnings.

7.2.3 Job quality in the enterprises

This research investigates the job quality of core employees, as low-level workers are commonly outsourced. In general, the job quality in the state-owned enterprise (WE1) is better in some aspects than that in the private enterprise (WE2). First, regarding earnings and benefits from job, the chairman, general manager, deputy general managers and chief engineers in WE1 receive annual salaries, while most employees’ earnings include a basic wage, performance wage and other allowances. The basic wage is decided according to years of work and work position, while the performance wage is affected by the enterprise's profits. Other allowances include a transport allowance, phone allowance, and so on. There are various benefits and welfare in WE1, such as annual health check-ups and holiday trips. In WE2, the wage is similar to WE1, in that management staff have fixed wages whilst workers receive basic and performance-based wages.

Second, from the perspective of working hours and work-life balance, a difference exists between administrative departments and other business departments, as the former have regular working hours while the latter have a flexible working schedule. The normal schedule in WE1 is eight hours per day for five days per week, though working overtime is common in the marketing department when it has projects. Although there is no pay for working overtime, the enterprise (WE1) has the policy of "special position, special salary" to reward employees who conduct more projects by the end of the year. Despite this, the two participants interviewed think their work-life balance is good because the enterprise dose not encourage overtime working. In contrast, the working hours in WE2 vary dramatically among people working in projects. Working overtime is very frequent, and people usually work everyday continuously until the project is finished, though they can work in shifts; they then take a period of holiday. The overtime working is not paid. Therefore, the work and life are very unbalanced in WE2.

Third, in terms of safety, security and equality, the physical safety in WE1 is relatively higher than that of other enterprises in the same industry, for several reasons. For example, landfill is not constructed at a great height, and is thus relatively safe; hence, accidents have been rare so far. In terms of chemical safety, the enterprise's preventive measures are strict. In contrast, the safety in WE2 is lower than in average enterprises, as the job involves working at heights and using flame and chemicals, thus posing a potential risk of injury. Nevertheless, to avoid dangers, the enterprise stresses safety and standard operation, and has learned advanced practices from the world's top 500 enterprises. The security in both enterprises is high, as jobs are very stable. The overall equality in WE1 and WE2 is ensured, as employees are treated fairly. For example, the enterprises have open standards which ensure that employees receive their wages fairly. However, there is unbalanced gender distribution in WE2, where the majority of employees are male. This is due to the nature of the job in the industry, which involves much engineering and construction work that currently attracts predominantly male workers.

Fourth, concerning the aspect of skills and development, WE1 has internal training for delivering new technologies in its business. As an enterprise with the qualifications of second-level municipal engineering and third-level environmental protection, the enterprise is required to have its employees obtain technical certificates in order to maintain the enterprise's qualifications. Therefore, employees have to take exams and obtain relevant certificates such as second-level constructor, documenter, technician, and quality controller. They also need to undergo continued training after two to three years. In contrast, the training in WE2 mainly focuses on technology and safety aspects, and more importantly, it puts an emphasis on mentoring engineers.

Fifth, regarding autonomy and social dialogue, WE1 has a labour union in the Party and mass work department, which is concerned with employees' job satisfaction and organises a union congress annually. The activity of listening to employees' voice is conducted twice each year, in which employees can express their opinions regarding science and technology issues. If the advice is accepted and proved to be effective, the employee will be rewarded. For any ideas and suggestions on business, employees can express them through the president's mailbox. In comparison, autonomy and social dialogue is reflected in more informal ways in WE2. Employees in any position can have a voice and deliver their ideas through daily communications with colleagues. Moreover, WE2 encourages managers and engineers to take charge of projects by delegating power to them.

Finally, regarding policies promoting job quality, WE2, for instance, has rules to ensure employees' safety by holding meetings every week and providing safety training compulsorily. In order to create a harmonious work environment, WE1 organises activities such as excursions and sports matches, while WE2 encourages employees to work together and to feel at home. Moreover, as WE2 is dominated by males, it plans to employee more females in the future, in order to activate the work atmosphere; this is based on the belief that a mixture of genders is better than single gender in an enterprise's work environment.

7.2.4 Relationship between innovation and job quality

From the perspective of the relationship between innovation and job quality, both innovation's impact on job quality and job quality's impact on innovation were explored. According to the interviews, innovation has some influence on job quality through changes made in different aspects. Technological innovation tends to have indirect impacts on job quality, while organisational innovation, especially when relating to employees, tends to affect job quality directly. For example, as WE1 is dominated by technological innovations, the innovations in the enterprise mainly affect three aspects of job quality, namely earnings, safety and self-development. To be specific, the innovations of new technology and product lower the cost and increase the enterprise's revenue, thus also increasing rewards for employees in return. Moreover, as technology advances, the enterprise's products and chemicals become less poisonous, thus improving the employees' job safety. Furthermore, as employees make achievements in research and innovation, they receive experience and are more likely to acquire opportunities for promotion, which is an important process in their development. Situations were similarly discovered in WE2, as technological innovation was believed to increase job safety and the efficiency of work. In terms of organisational innovation, the management innovations in WE2 have direct impacts on job quality, because the new wage system directly changes the earnings of employees. Moreover, introducing a system of performance-based rewards dramatically promotes employees' motivation and enables them to work with passion.

In terms of job quality's impact on innovation, the two enterprises responded consistently, believing that job quality can affect innovation through the following aspects: earnings and benefits from job; safety, security and equality; skills and development; autonomy and social dialogue. First, earnings and benefits are important to innovation because higher rewards stimulate higher motivation for innovation. The example of the "special position, special salary" policy from WE1 proves that the earning dimension can work together with innovation, creating a virtuous cycle of improving both employees' job quality and the enterprise's performance. On the one hand, as the policy encourages employees to be more innovative and more productive, the business booms and the enterprise is benefited. On the other hand, employees' earnings rise due to better performance and higher achievements. Second, safety, security and equality play an essential role in innovation, as they provide good conditions and environment for innovation. If the job is not safe, secure and equal, employees cannot concentrate well on their work and are less likely to innovate. *"Because the job is stable, you can settle down in your job, as sometimes a project takes long time. If you are likely to be fired anytime, you cannot concentrate"*, commented by the senior supervisor (WE1). Similarly, a secure job is regarded by the chairman (WE2) as a primary factor for innovation, because it enables employees to focus on their work and to have passion. Third, skills and development ensure the capability for innovation. This is important for this industry in which technology is key, because it is necessary to continuously learn new things. Compared to training, the exchange of technology is more important, because the former is a one-way delivery of skills and knowledge, while the latter is an interactive process of learning and development. Thus, through communication and exchange of ideas, innovation is likely to occur. Fourth, autonomy and social dialogue encourages employees to have a voice, which can promote innovation. For instance, WE1 considers and adopts employees' suggestions that are useful and reasonable for its future; and WE2 encourages its employees to innovate by letting them have their voice heard and to be respected. As the chairman (WE2) noted, this is helpful in motivating employees, especially those who are able to innovate but are unwilling to do so.

In summary, innovation and job quality affect each other, and have both direct and indirect impacts on each other. Technological innovations often have indirect influences on job quality, through various mechanisms such as increased revenue and safer equipment; whilst organisational innovations, especially those relating to employees, normally affect job quality directly, because the innovations change different aspects of job quality. Due to different mechanisms, innovation can influence different dimensions of job quality. Similarly, different dimensions of job quality can impact on innovation. Thus, if applied properly, with certain stimulus policies, innovation and job quality can work together, generating a virtuous cycle.

7.2.5 Summary

It can be concluded that the industry of water conservancy, environment and public facilities is innovative because technology is highly important to the industry. The job quality in state-owned enterprise is higher than that in the private enterprise, especially regarding aspects of work-life balance and safety. According to the analysis, innovation has both direct and indirect impacts on job quality. Technological innovation tends to affect job quality indirectly. As technology and products advance, the earnings, safety and employees' development aspects improve through different mechanisms. Organisational innovation, typically when it concerns employees, influences job quality directly. In the reverse direction, four dimensions of job quality are important to innovation: earnings and benefits from job; safety, security and equality; skills and development; and autonomy and social dialogue. The government has favourable innovation policies for high-tech enterprises in the industry, while the enterprises have reward-based stimuli to encourage employees to innovate. If applied properly, some policies, like the "special position, special salary" policy, can enhance the virtuous cycle between innovation and job quality. Based on the condition of each enterprise, different solutions are applied to improve the job quality of employees.

7.3 The finance industry

7.3.1 Introduction of the enterprises

The state-owned enterprise (F1) investigated is a bank that has its headquarters in Beijing and branches across China; it also has branches overseas. The specific bank interviewed is one of the branches in Shanghai. There are mainly four departments in the organisation, these being the personal banking department, company business department, background management department, and middle management department. Typical work positions in F1 consist of president, executives, and ordinary employees including tellers, account managers, wealth managers and corporate account managers. The two participants interviewed include one senior executive and one wealth manager. Having worked in this bank for 9 years, the senior executive had previously worked as the executive for personal banking, and now is in charge of wealth managers and relevant areas. The wealth manager has been working in this bank for 12 years, from an ordinary employee to becoming a manager, and is thus familiar with the bank; her task is to maintain old customers and to choose products through new product learning and risk rating. The reason for choosing a wealth manager instead of a front-desk employee is because the latter workers are mostly newcomers who are less familiar with the bank. In contrast, the wealth manager has worked in the bank as both an employee and a manager for a long period, and therefore has more experience and is more suitable to be interviewed. Nevertheless, the difference in participants' hierarchical position is achieved, as the senior executive and the wealth manager occupy higher and lower management positions respectively.

The private enterprise (F2) interviewed is an investment group which conducts business mainly in four aspects, covering health, happiness, wealth, and intelligence. The health aspect is operated by its subsidiaries, involving the areas of pharmaceutical manufacturing, pharmaceutical distribution and retail, healthcare services, and diagnosis products and medical devices. The happiness aspect is related with consumption upgrade and demand, especially among the middle class in China, through the acquisition of famous overseas fashion brands, holiday villages, and holiday tourism companies. Regarding the wealth aspect, it invests in various enterprises in financial fields such as insurance, banking, and securities, both in China and overseas. The aspect of intelligence mainly deals with Industry 4.0[11] and intelligent manufacturing; for example, the enterprise helps traditional industry to transform. Unlike the other private equity investment, F2 emphasises the importance of value investment, which aims to create an internal ecosystem that realises the synergies among different fields. For example, the health aspect can have some relationship with the wealth aspect, e.g. in terms of insurance, by sharing the same client resources. By helping its invested enterprises create more values and synergies, an internal ecosystem can thus be generated in F2. In terms of the staff structure, there are three stages: the front, middle and back. The front stage mainly includes investment personnel in different areas and districts, while the middle stage consists of departments dealing with financial, legal and tax affairs separately. The back stage involves departments of post-investment management and IT. The two interviewees include one senior investment manager and one employee in the public relations department. The investment manager has been working in F2 for two years, and the public relations employee has been in the enterprise for four years.

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[11] Industry 4.0 refers to the digitalisation and intelligentisation of supply, manufacturing and sales information by using cyber-physical system to achieve rapid, efficient and customised supply of products.

Source: https://www.cleverism.com/industry-4-0/.

7.3.2 Innovation in the enterprises

According to the interviews, technology is important in the finance industry because it not only changes the way services are delivered, but also alters the approach by which internal management is conducted. Apart from innovations relating to technology, innovations of new financial products and new marketing methods in the bank (F1), and innovations of new investment ideas and management practices in the investment enterprise (F2), were mainly found.

In the banking system, F1 has made innovations in different aspects. First, online banking and mobile banking enable F1 to provide its services more conveniently and safely than traditional banking. Internet finance (ITFIN) is based on the technological innovation of IT and the Internet, as well as the use of big data, which enables financial information to be updated swiftly. For example, customers can make a remittance, check currency movement, or book to withdraw foreign currency through mobile banking. F1 also has a series of official accounts on Wechat, a Chinese social networking app, where the latest information is posted. Moreover, F1 has applied the technology of artificial intelligence (AI) to replace manpower. For example, the smart lobby machine and smart cashier machine have replaced receptionists and cashiers. In the future, the bank-lobby manager is likely to be replaced by a smart financial machine. Second, F1 innovates its financial products, including credit cards, fixed-income instruments, and other personal banking products and company financial products. Third, in order to retain and acquire clients, F1 has been dedicated to innovating new marketing methods. For example, it changes the combination of financial products to meet different needs from clients; it also uses an online app as new platform to promote new products for marketing purposes. Finally, in terms of internal management in F1, there are innovations on management tools. For instance, it has developed a computer programme for performance statistics, which improves the efficiency of internal management.

In F2, innovations happen in different aspects as well. First, an mobile app has been adopted for internal management and business development. By using mobile Internet technology, the enterprise’s mobile app connects internal ancillary resources for global operations, such as human resources, legal compliance, finance and auditing, in order to build up strong middle and back offices that share global internal ancillary resources. The app has already covered around 40,000 staff and over 100 enterprises. According to the interviewees (F2), it optimises the procedure of decision-making and brings convenience to jobs. For example, employees are able to contact any colleagues from any departments through this app. Also, a wide variety of functions can be realised on the app, such as applications for business trips, booking air tickets, attendance records, meeting-room booking, visiting guests, video conferencing, and the approval and signature of documents.

Second, investment ideas have been innovative in F2. For instance, investments were made together with a state-owned listed company in China during the overseas merger and acquisition of a German automobile company; this was done because the listed company has vast resources in the invested industry, such as factories and operation experience, a good relationship with the government, and numerous clients, including automobile clients, which are helpful to achieve synergies and values. In order to ensure the rights and interests of F2, it holds stock shares of the Chinese listed company. Another example is the innovative idea of “insurance plus investment”, in which F2 acquired overseas insurance companies and used local currencies to invest in local enterprises. Such approach has advantages, as it solves the problem of high financing costs in China by introducing overseas financing with low interest rates and low costs. Moreover, F2 values the post-investment management, which is different from traditional investments that aim to sell at a higher price. F2 provides resources for invested companies and encourages them to make synergies inside the enterprise, a practice which is beneficial to the creation of an internal ecosystem and for adding value. Specifically, F2 helps its invested overseas companies to land and extend their market in China, providing a strategic investment that is good for future development. Furthermore, the invested areas of "health, wealth and happiness" are also innovative, because they are in line with the theme of the trends.

Third, concerning innovation in management, employees provide suggestions during work. For example, employees suggested building the enterprise's own museum to introduce the history of F2, and have calculated the relevant budget. The suggestion has been approved by the boss. Moreover, the "lunch sharing session" was also proposed by employees who prefer to have training during lunchtime; this suggestion was adopted by the HR manager.

Regarding policies that promote innovation, F1 has an internal reward system to encourage employees to innovate by awarding the enterprise's most innovative team each year. It also links innovation to employees' performance, adding credit to the assessment of employees if they have good performance in innovation. The policies were seen to be effective by the interviewees, because employees work for money, and linking innovation to performance and earnings is the most direct approach to motivate them. In comparison, although there is no explicit innovation policy in F2, it reminds employees of the importance of innovation through its enterprise culture. As F2 values the outcomes and profit, employees are encouraged to complete their tasks by applying innovative approaches.

7.3.3 Job quality in the enterprises

According to the interviews, the job quality in the state-owned bank (F1) is higher than that in the private investment enterprise (F2), especially in terms of working hours and work-life balance, and job security. First, regarding the dimension of earnings and benefits from job, the wages in F1 consist of a basic wage and performance wage, in which the former links to job rank and the latter is related to the employee's practical output. The state-owned enterprise (F1) also provides a wide variety of benefits for its employees, including an annual health check-up, holiday trip, lunches, fitness club, laundry coupons, hairdressing, newspapers and fruit. In comparison, the wages in the private enterprise (F2) are below the average in the industry; this is *"Because our enterprise is big and offers big-platform values to our employees, they do not need high wages for hiring"*, explained the senior investment manager (F2). Furthermore, the rewards are low among non-investment staff, and the reward system in investment departments is rigid, based on completing projects. Employees cannot receive the reward when investment is successfully made, but only after the enterprise exits the project, as it is based on the profit after exit. The non-wage benefits in F2 include insurance, and gifts from invested companies.

Second, in terms of the working hours and work-life balance, there is a noticeable distinction between the state-owned enterprise (F1) and private enterprise (F2). While F1 has fixed working hours, and the balance between employees' work and life is well achieved, there is frequent extra work in F2, and the work and life are obviously unbalanced, especially in investment departments. The job of investment staff features long working hours, typically from 9 a.m. to 7 p.m. or later. As the senior investment manager commented, they basically have no private life and time, and are equally busy or can only relax at the weekend. Therefore, it can be seen that the job in F2 is busier and more stressful than that in F1.

Third, in the dimension of safety, security and equality, a difference also exists between F1 and F2 concerning job security. The job in the state-owned enterprise (F1) is highly secure, whilst the private enterprise job (F2) is unstable because of the intense competition in the organisation. Employee turnover is high in F2, especially in the front-stage departments; employees normally work there for just one year, and the situation of a five-year stay is rare in F2, excepting higher-level management. Due to the nature of the job in the finance industry, which does not involve much dangerous work physically, the safety in both enterprises is high. Regarding equality, both enterprises treat their staff fairly based on relevant standards, and there are relatively numerous female employees in the industry.

Fourth, from the perspective of skills and development, F1 has workplace training and encourages employees to acquire relevant qualification certificates. The internal training normally takes place every two weeks, and there is no fixed requirement for external training. The situation is similar in F2, where training is also delivered every two weeks. However, the training in F2 is mostly given by its invested companies. Consequently, while the training in F1 focuses on skill development, the training in F2 is oriented towards industry experience, shared by entrepreneurs.

Fifth, regarding autonomy and social dialogue, employees in F1 can give suggestions on their business and communicate with their boss at any time.

Formally, they also have an employee representatives' meeting every year. In F2, employees have the right to make initial decision within their working responsibility; however, the final decision is often made or approved by the boss.

In terms of job quality policies, F1 has been continuously improving the job quality of employees. For example, it changed from a fixed wage to wages that include both fixed and performance-related wages, in order to ensure fair treatment and motivate employees. It also has staff representatives' meetings, in which employees can express their ideas on aspects such as employees' treatment, welfare and work. In F2, the HR department has tried to promote the harmony among employees and improve job quality gradually, though the changes were not obvious.

7.3.4 Relationship between innovation and job quality

The two-directional relationship between innovation and job quality was revealed in the two financial enterprises interviewed. On the one hand, innovations have influences on of job quality, mainly in terms of earnings and benefits from job, skills and development, and working hours and work-life balance. First, innovations increase the earnings of employees through improved performance and profit. For example, by applying innovative investment ideas, employees in F2 can make deals more easily, which improves their performance and increases their rewards. Similarly, because the new financial products or the new marketing methods boost F1's performance and profits, employees receive higher performance wages. Moreover, as F1 has an internal reward system for innovative teams, employees are motivated to be innovative in various areas, such as product, process optimisation and internal management tools. Second, innovation influences the skills and development dimension when new technology and new products are introduced, because learning is needed for the implementation of innovation. A typical example is when the online banking, mobile banking and smart bank machines are initially implemented, employees in F1 are required to take training and become familiar with the system. Similarly, the new financial products also require employees' learning before they are released to the market. Third, innovation in the work schedule affects the working hours and work-life balance dimension of job quality. As mentioned, the innovation of the "lunch sharing session" in F2 now holds employee training at lunchtime rather than at the weekend, thus saving time and improving employees' work-life balance. Furthermore, apart from the job quality dimensions listed in the framework, work efficiency can also be increased due to innovation, and employees feel a sense of achievement when they originate innovations. Consequently, based on above discussion, different innovations can affect different aspects of job quality.

On the other hand, job quality can promote innovation in both enterprises, mainly through the following dimensions: earnings and benefits from job, working hours and work-life balance, skills and development, and autonomy and social dialogue. First, the respondents in the two enterprises commonly regard the earning aspect to be important for promoting innovation. As the public relations employee in F2 noted, *"innovation requires a material foundation, which is the most important element"*. Second, working hours and work-life balance provide space for creating new ideas. Participants from both the state-owned enterprise (F1) and private enterprise (F2) viewed this dimension as a priority, though they have different experiences of this dimension. For instance, jobs with fixed working hours and a good balance between work and life enable employees to think actively and do their job better. In contrast, employees who have long working hours and an unbalanced work and life are less likely to have the opportunity for innovation. As the senior investment manager (F2) explained:

When you are struggling and very busy, it is impossible to innovate. An innovative idea often comes when you are relaxed ... I feel my job is too busy, which can lead to mechanised thinking, and it consumes both mental and physical energy to think about this problem (innovation).

Third, skills and development enables employees to be more capable of generating innovation. Fourth, autonomy and social dialogue promotes innovation through employees taking charge of tasks and giving suggestions. Moreover, an internal system providing incentives for innovation and a good work environment are both regarded as highly important to innovation in the two enterprises investigated. As an internal system that encourages innovation and values talents, enterprises can offer incentives such as rewards, opportunities for promotion, and linking innovation to performance, in order to motivate employees. In addition, a good work environment with a culture of sharing and cooperation within the enterprise can reduce barriers to innovation. For example, innovation sometimes requires the integration of resources, which needs cooperation between different departments in the enterprise. If there is fierce competition within the enterprise, it is difficult for the innovator to communicate with colleagues and to achieve relevant goals. Therefore, a harmonious work environment and culture is essential.

7.3.5 Summary

The interviews in the finance industry indicate the importance of technology in service provision and management aspects, as it changes their traditional approaches. Innovation occurs in different areas including both technology and non-technology, as the enterprises continuously improve their products, services, marketing methods and organisational management. The overall job quality in the finance industry is good, though differences exist between the state-owned and the private enterprises: jobs in the former are well-paid, stable and secure, while those in the latter are relatively stressful, insecure and challenging. Innovation can affect job quality both directly and indirectly, through mechanisms like improved performance in the latter case. Not only can organisational innovation impact on job quality directly, but also technological innovation can affect job quality directly, e.g. new technology or new products/services trigger skill development. Innovations mainly affect the earning, training and work-life balance aspects of job quality; and similar job quality aspects, plus the autonomy and social dialogue dimension, are regarded as important for promoting innovation in the finance industry. Instead of seeking to conclude the direct or indirect impact of job quality on innovation, it is found to be more appropriate to consider in the ways in which different dimensions of job quality play different roles in promoting innovation. According to the interviews, earning is an important material foundation for innovation, while working hours and work-life balance provide employees with essential space for innovation. Skills and development enables employees to be capable of innovation, whilst autonomy and social dialogue offers channels for innovative ideas to be heard and generated. Moreover, to improve job quality and innovation, the internal innovation-encouraging reward system and harmonious work environment are important, and have proved to be effective in the industry.

7.4 The wholesale and retail industry

7.4.1 Introduction of the enterprises

The state-owned enterprise (WR1) interviewed was founded in 1900; it initially sold arts, crafts, and Chinese traditional stationery such as Jiangsu and Hangzhou fans, poetry and letter paper, the "four treasures of study",[12] and decorative framing of calligraphy and painting. Later, it extended its business to include wood-block prints, calligraphy and painting. Now, it has become one of the leading enterprises in the art market in China, with key business ranging from auctions, store sales, antiques, and art dealing, to e-business, art education and wood-block printing. This research interviewed two staff in the art development company belonging to the group. The company is dedicated to wood-block prints, art crafts selling, and relevant exhibitions and advertisements. The two respondents in the interview include one store supervisor and one employee, whose jobs involve selling products in the store and presenting wood-block printing on site. Both of them have an educational background in painting and have been working at this enterprise for five years. Their main task is to replicate famous Chinese paintings through the technique of wood-block printing.

The private enterprise (WR2) investigated was founded in 2001, and conducts the import and sales of marble for building and decoration purposes. The marble materials are exploited from mines and are processed before being sold. The enterprise has around 70 employees and consists of a production department, accounting department, sales department and human resources department. The interviewees in WR2 include the chairman and a factory supervisor. The chairman is the founder of the enterprise; the factory supervisor has been working at WR2 for ten

[12] The four treasures of study comprise the four traditional Chinese stationery items: brush, ink stick, paper and inkstone.

years, initially starting as a worker, and is now responsible for management and technical support.

7.4.2 Innovation in the enterprises

Few innovations were found in the two enterprises interviewed. Also, the innovations discovered in both enterprises belong to the incremental type of innovation, rather than radical innovation, which is more obvious. There are product and marketing innovations in WR1: on the one hand, it has created cultural and creative products, such as crystal paperweights and bookplates, as its side-line range products. On the other hand, based on traditional stores, it extended its sales channel to include various forms of selling through online platforms, art exhibitions and book fairs. Therefore, WR1 has changed from traditional to modern approaches in its business operations.

In WR2, there are process innovations, including the adoption of more advanced machines and the improvement of process techniques. On the one hand, WR2 increases the input and equipment for marble processing annually by applying more convenient and advanced cutting and polishing machines, which results in better-quality products and higher productivity. On the other hand, the skills and techniques for cutting marble have been improved, to increase the utilisation of marble materials. As the chairman noted: *"we make use of the margin to achieve higher usage and lower cost ... gradually, this will become innovation"*. Nonetheless, many traditional elements are still necessary and important for this industry, and the innovation in this industry is limited for various reasons. First, it is a traditional industry based on natural resources; therefore, innovation cannot be realised in terms of materials, as they are not recyclable. Second, manual work is essential, as it does some jobs that cannot be replaced by machines. For example, due to the special condition of material being natural marble, it cannot be ensured that every slice of marble is perfect after cutting. Therefore, workers must check for cracks carefully and repair them manually. Also, as natural resources are precious, the manual repair of cracks is necessary in order to avoid waste. Third, the innovation in this industry is not well developed because of a lack of research, and pressures from environmental protection concerns. On the one hand, as the overall consumption and scale of natural marble materials for building and decoration is relatively low in the market and the research costs are high, there is no scientific research on the technology used in the industry. On the other hand, as the government has been paying more attention to environmental issues, the use of stone will be reduced and partially replaced by environmentally friendly materials. Therefore, innovation in the industry is not well developed, in spite of some process innovations.

Neither of the enterprises had a policy on innovation, due to several reasons. For example, as discussed above, innovation in WR2 is limited because of the key role of traditional elements including natural materials and manual labour, which cannot be replaced by innovative materials and machines respectively. The development of innovation in WR2 is also confined, due to the huge cost of innovation research and the limited business scale in the market. Innovation in WR1 is not greatly encouraged because the leader speaks and employees merely follow instructions.

7.4.3 Job quality in the enterprises

The overall job quality in the enterprises interviewed was reported to be relatively poor, as the respondents in WR1 commonly expressed their wish to leave without hesitation if they found better opportunities elsewhere. Little attention has been paid to the job quality in the two enterprises. First, the earnings in both enterprises are low, and as they are homogeneous and dominated by basic wages, employees sometimes receive rewards, but they are limited. For example, WR2 gives rewards to employees who have full attendance and work overtime. However, the wage is limited, as employees only have a basic wage. Regarding benefits from job, employees in WR1 receive some benefits during festivals, while employees in WR2 enjoy free accommodation and meals.

Second, in terms of working hours and work-life balance, the job in the state-owned enterprise (WR1) is fixed, from 8.30 a.m. to 5 p.m. for five days a week, without extra work. In comparison, employees in WR2 sometimes have to work overtime, but they are paid. Employees' work and life were reported to be balanced in both enterprises.

Third, regarding safety, security and equality, jobs in the state-owned enterprise (WR1) are better than those in the private enterprise (WR2) because they are safer and more secure. Although both enterprises treat old employees better than newcomers, this is fair because older employees are more skilful and more familiar with the business.

Fourth, from the perspective of skills and development, both enterprises are limited except in the training of skills. In WR1, employees receive training in calligraphy and Chinese painting, whilst in WR2 employees are trained in skills of production and processing which are related to their businesses.

Fifth, in terms of autonomy and social dialogue, employees' voice is small in both enterprises. In WR1, employees follow instructions from their superiors. Similarly, the decisions in WR2 are largely made by the managers. Therefore, both enterprises do not delegate powers to employees, though they are allowed to give suggestions.

According to the above discussion, the job quality in the wholesale and retail industry is poor, especially concerning the aspects of earnings, development and autonomy. Though the state-owned enterprise has relatively better job quality in terms of working hours and work-life balance, it is still disappointing, as the respondents (WR1) showed dissatisfaction with their job and wages, stating: *"what we receive might not match what a milk tea seller earns."* They regarded their current job as a springboard to better jobs in the future. Furthermore, it was discovered that although art jobs are respected in China, their job quality is actually very poor, characterised by low pay. The respondents (WR1) felt that craftsmen are not well respected in the current circumstances in China.

7.4.4 Relationship between innovation and job quality

Innovation and job quality were found to have a weak link in the wholesale and retail industry. In the case of WR1, there is no relationship between innovation and job quality, while in WR2 innovation has a limited impact on job quality. According to WR1, innovation does not affect job quality, nor does job quality affect innovation, because everything is decided by the leader; employees do what they are told to do. For example, in terms of wood-block printing, they follow the leader's idea on which paintings to draw rather than deciding the content by themselves. Employees innovate product if the leader wants something new. However, there is no difference in their job quality after innovation, as no reward or benefits are given. Employees innovate only when they are asked to do.

In WR2, innovation has an impact on job quality in terms of the aspects of earning, safety and skills. First, through the application of new advanced machines, manual labour has been relieved, thus reducing employees' work intensity and increasing work efficiency. From the perspective of enterprise, the new machines improve productivity and bring more revenues, which in turn result in a rise in employees' earnings. Moreover, employees receive a higher salary because they become more experienced, skilful, and have innovations in their work process. Second, as machines advance, the job safety of employees improves accordingly. Third, due to the sophistication of new machines, employees are required to learn the operation of machines before they are put into use. In terms of job quality's impact on innovation, no relationship was found in WR2. Consequently, the relationship between innovation and job quality is weak in the industry of wholesale and retail, because very little interaction was found in the research.

7.4.5 Summary

Incremental innovations in product, process and marketing were discovered in the wholesale and retail industry, which has poor conditions of job quality, especially in terms of earnings, development and autonomy. The relationship between innovation and job quality is weak in the industry, with innovation affecting some aspects of job quality only as a result of innovation application. Job quality, in contrast, does not influence innovation because employees are not encouraged to innovate. Moreover, there is no policy in the enterprises to promote innovation or job quality, as leader makes decisions. Consequently, the linkage between innovation and job quality is limited in the industry.

7.5 Analysing the findings across the industries and cases

Previous sections have analysed innovation and job quality in the cases within the four selected industries. The findings reveal that there are variations in terms of innovation, job quality, and the relationship between them among the different industries. First, regarding innovation, the findings show that technological innovations, particularly product innovations, occur in all industries and almost all cases. Other types of innovation, both technological and non-technology occur in some cases.

More specifically, product, process and organisational innovations were mostly discovered in the four industries. By comparing innovations in different industries (see Table 7.2), it was found that the scientific research and technical services industry, and water conservancy, environment and public facilities industry, are dominated by technological and organisational innovations, whilst the finance industry and wholesale and retail industry have more diversified innovations. While innovation in the other three industries is commonly encouraged, innovation in wholesale and retail industry has not yet been emphasised. According to the interviews, technology is important for innovation, because it not only leads to new products and processes, but also results in new marketing and management methods. Technological innovations are dynamic in the industries where science and technology are key, especially the industry of scientific research and technical services, which involves active scientific research and technical development. However, the scientific and technological activities discovered are different among industries. For instance, the industry of water conservancy, environment and public facilities has technological innovation because it continues to improve the technology of its products and projects. The finance industry is characterised by the application of new technology and online platforms to replace its traditional service provision, marketing approach and internal management. The wholesale and retail industry, though low in innovation, still has some technological innovations, as it improves its products, processes and marketing methods. Apart from technological innovations which are mostly discovered in the industries investigated, organisational innovations are also commonly found; this adds new findings to the existing literature, by showing that dynamic organisational innovations are taking place in China, despite attracting little attention at present. Changes concerning organisational arrangements, internal management and workplace practices are found in the enterprises interviewed, which in general encourage more cooperation, resource integration, procedure optimisation, autonomy and employee values.

Table 7.2 Innovations mentioned by different industries and sectors

		Product innovation	Process innovation	Marketing innovation	Organisational innovation
Scientific research and technical services	Public	x	x		x
	Private	x	x		
Water conservancy, environment and public facilities	Public	x			
	Private	x	x		x
Finance	Public	x	x	x	x
	Private	x	x	x	x
Wholesale and retail	Public	x		x	
	Private		x		

* "x" means the type of innovation was mentioned by the industry and the sector interviewed.
Source: Author's case study findings.

Compared with the statistical analysis in Chapter 6, the interview results show consistency, in that the scientific research and technical services industry ranks top in terms of technological innovation level, followed by the water conservancy, environment and public facilities industry, finance industry, and wholesale and retail industry. However, as more types of innovation are explored in the interviews, the finance industry is found to be a good example of an innovative industry, with both dynamic technological innovations and non-technological innovations. Therefore, on the one hand, the qualitative analysis complements the statistical analysis, as more types of innovation are covered. On the other hand, the qualitative research reveals the limitations in official statistical data. The overall innovation level of the finance industry is underestimated in the statistical analysis, which only examines the technological type. Thus, the current statistical data for innovation in China, including in this research and other previous studies, is unable to present the overall innovation capability well, because data are limited and no marketing or organisational innovations are involved. Moreover, the interview findings are also consistent with the literature review in finding that technological innovation is dominant in China's policy arena and economy. However, non-technological innovations, including organisational innovation and marketing innovation, are also common and dynamic in different industries and companies; this reveals a neglect within relevant policy and research attention in China. The organisational innovations discovered in the interviews resonate with the trend discovered in the literature review, that a more open, delegated and employee-valuing business system is coming into existence in China.

Second, concerning job quality, variations also exist across different industries and enterprises (see Table 7.3). In general, job quality in the scientific research and technical services industry is high, while that in wholesale and retail is low. In the finance industry, the overall job quality is high, though private enterprises have problems of overtime work and an imbalance between work and life. The job quality in the water conservancy, environment and public facilities industry is moderate, characterised by a high level of autonomy but potential risks of work safety and extra work. Apart from industrial differences, it is common that the overall job quality in state-owned enterprises is higher than that in private enterprises in the same industry, as jobs in state-owned enterprises tend to be more stable, secure, fixed and well-paid, with a higher degree of autonomy that is organised in formal ways, e.g. through annual employee representatives' congresses. But it should be noted that the trade union, often situated in the Party and mass work department, are under the control of the Communist Party in China. Private enterprises normally have problems of overtime work and an imbalance between work and life, due to less formal arrangements in the enterprise, and pressures from the market and competitors. The private enterprises are aware of the importance of employees' autonomy and voice, but choose to achieve this through informal means, e.g. private meetings and conversations.

Table 7.3 Job quality by industry and sector

		Earnings and benefits from job	Working hours and work-life balance	Safety, security and equality	Skills and development	Autonomy and social dialogue
Scientific research and technical services	Public	High	Good Flexible, balanced	Medium	High	High
	Private	Medium	Good Fixed, balanced	Medium	Medium	Medium
Water conservancy, environment and public facilities	Public	Medium	Medium Fixed, work overtime, balanced	Medium	Medium	High
	Private	Medium	Bad Work	Low	Medium	High

			overtime, unbalanced			
Finance	Public	High	<u>Good</u> Fixed, balanced	High	High	Medium
	Private	Medium	<u>Bad</u> Work overtime, unbalanced	Medium	High	Medium
Wholesale and retail	Public	Low	<u>Good</u> Fixed, balanced	Medium	Low	Low
	Private	Low	<u>Medium</u> Fixed, sometimes work overtime, balanced	Medium	Low	Low

* The levels of job quality are based on comments from respondents in the interviews.
Source: Author's case study findings.

The results are in line with the statistical analysis (see Figure 7.1), regarding the job quality levels of the four industries interviewed, as the scientific research and technical services industry and finance industry have relatively high job quality, whilst the water conservancy, environment and public facilities industry, and the wholesale and retail industry, have lower job quality. The difference between job quality in state-owned enterprises and private enterprises can be traced back to the historical and economic reasons mentioned in the previous literature review, where jobs in state-owned enterprises transformed from the old "iron rice bowl", and are now still half-controlled and governed by the state; while jobs in private enterprises are relatively less stable and more competitive because they are directly affected by the market economy. However, as Sheldon et al. (2011) point out, more Chinese employees are coming to expect a new standard of ideal career development that not only focuses on pay rises and promotion, but also weights the opportunities for self-development and enhancement. Employees, especially those with higher education and more talent, may prioritise the pursuit of their career above staying in an organisation; in this case, the balance between work and family, for example, has a potential impact on their career progression. Therefore, given the variations in job quality among enterprises, and a free job market, it is employees' choice to make a trade-off when they choose their employment.

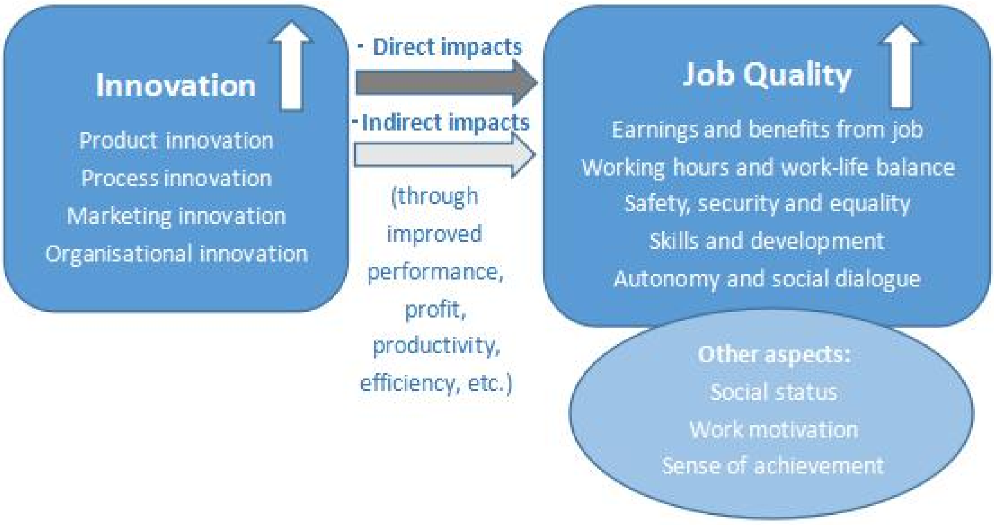
Third, in terms of the relationship between innovation and job quality, innovation and job quality interact with each other except in the wholesale and retail industry where the relationship is weak. Table 7.4 presents innovation's impact on different aspects of job quality by industry. According to this research, different innovations have different impacts on job quality, and can influence different dimensions of job quality either directly or indirectly through various mechanisms (see Figure 7.1). Innovation can affect job quality directly, leading to improvements in different job quality dimensions depending on the content of innovation. For example, when new things such as new products, new procedures, new marketing methods and new organisational practices come into use, learning and training are required to implement innovation; thus, innovation promotes the dimension of skills and development directly. The innovation of applying less poisonous chemicals and more advanced machines at work can lead to higher job safety directly. Moreover, organisational innovations that involve changes in any aspects of job quality can affect job quality directly. For instance, innovations in the wage system and employees' work schedule impact on job quality directly. Innovation can also affect job quality indirectly, through different mechanisms. For example, innovation commonly increases employees' earnings through improving the company's performance and profit. The working hours and work-life balance dimension is improved indirectly, as technological innovations promote productivity and work efficiency. Employees have better opportunities for development, as they are more likely to be promoted if there is innovation in the company. Furthermore, innovation impacts on other aspects beyond the job quality framework in this research. For instance, it promotes employees' social status and work motivation if they have innovation; it also brings sense of achievement to innovative employees.

Table 7.4 Innovation's impact on different job quality aspects, by industry

	Earnings and benefits from job	Working hours and work-life balance	Safety, security and equality	Skills and development	Autonomy and social dialogue	Other aspects
Scientific research and technical services	x	x				Social status; work efficiency
Water conservancy, environment and public facilities	x		x	x		Work efficiency; work motivation
Finance	x	x		x		Work efficiency; sense of achievement
Wholesale and retail	x		x	x		Work intensity and efficiency

* "x" means the dimension of job quality can be affected by innovation in the industry interviewed.
Source: Author's cases study findings.

Figure 7.1 Innovation's impact on job quality



Source: Author's analysis from enterprise-level case studies

In the reverse direction, job quality impacts on innovation when innovation is encouraged. The prerequisite of having an innovation culture in the organisation is important, because employees can be motivated to innovate if they are expected to; otherwise, it is difficult to motivate employees to innovate at work. This explains why the wholesale and retail industry has limited innovation and a weak relationship between innovation and job quality: because innovation is not stressed in the industry. Table 7.5 lists different job quality dimensions that can affect innovation, by industry.

Table 7.5 Different job quality dimensions that can affect innovation, by industry

	Earnings and benefits from job	Working hours and work-life balance	Safety, security and equality	Skills and development	Autonomy and social dialogue	Other aspects
Scientific research and technical services	x		x	x	x	Recognition
Water	x		x	x	x	Recognition;

conservancy, environment and public facilities						respect
Finance	x	x		x	x	Work environment; culture of sharing and cooperation
Wholesale and retail						

* “x” means the dimension of job quality can affect innovation in the industry interviewed.
Source: Author’s cases study findings.

According to the qualitative analysis, all job quality dimensions in the framework can have impacts on innovation, as they play distinctive roles in promoting innovation through different channels (see Figure 7.2). The dimension of earnings and benefits from job not only provides basic supports for employees, as the dimension of safety, security and equality does; it is also an important motivation incentive for employees to innovate. This is because employees have higher motivation to innovate if they receive higher pay for doing so. The working hours and work-life balance dimension offers essential space for employees to innovate. It was commonly agreed by interviewees across industries in China that a job with a secured contract, decent pay and no pressure is favourable for innovation. While the autonomy and social dialogue provides opportunities for innovative ideas to be heard and developed, the skills and development dimension enables employees to be more capable of innovation and is important for continuous innovation through learning. Among the various dimensions of job quality, three of them are comparatively more important to innovation, as they are always mentioned by respondents in different industries. They are: earnings and benefits from job; skills and development; and autonomy and social dialogue. In addition, other aspects, including a harmonious work environment, culture of sharing and cooperation, and recognition and respect from others, can also encourage innovation.

Figure 7.2 Job quality's impact on innovation

Source: Author's analysis from enterprise-level case studies

To summarise, innovation and job quality mutually affect each other in an environment where innovation is encouraged. Three key points are identified regarding the overall relationship between innovation and job quality: 1) there is a two-directional relationship between innovation and job quality, as innovation impacts on job quality and job quality impacts on innovation; 2) there is a positive relationship between innovation and job quality, as higher innovation leads to better job quality and better job quality results in higher innovation; 3) there is both a direct and indirect relationship between innovation and job quality, as innovation can influence job quality either directly or indirectly, and job quality can affect innovation either directly or indirectly. As better jobs promote innovation and innovation results in better jobs, this research indicates that a virtuous cycle between innovation and job quality can thus be generated, with both of them improving each other. The relationship between innovation and job quality is illustrated in Figure 7.3, in which a virtuous cycle can be achieved through various mechanisms. On the one hand, higher innovation can lead to better job quality either directly or indirectly, through different mechanisms. To be specific, when an innovation occurs in an organisation, it can result in an improvement in different dimensions of job quality either directly or indirectly, due to reasons such as improved performance, profit, productivity and efficiency. On the other hand, higher job quality can in turn promote innovation through different channels. Changes in different dimensions of job quality pose different conditions for future innovation, and different job quality dimensions play distinctive roles in promoting innovation. In order to run the cycle continuously, it is suggested that enterprises introduce some incentive strategies that reward employees who have innovation, in order to lever both higher innovation and job quality.

Figure 7.3 Relationship between innovation and job quality

Source: Author's conclusion from enterprise-level case study analysis

7.6 Conclusion

The qualitative analysis reveals an overall positive relationship between innovation and job quality in China, through an exploration of four industries, and collection of extra data that are missing from the statistical analysis. Different industries were found to have different situations of innovation and job quality, mainly due to the distinctive nature of industries and organisations, according to aspects such as their businesses, job characteristics, management, and economic and policy factors. Being high-tech and emphasised by the government policy, the scientific research and technical services industry has both high technological innovation and high overall job quality. The industry of finance features the adoption of new technology, as well as new marketing and organisation methods, with a noticeable problem on work-life balance in the private enterprise investigated, due to the intense pressure and competition from the market. The water conservancy, environment and public facilities industry has potential safety risks at work, because jobs in this industry often involve construction and contact with chemicals which may cause injury or poisoning. But it continues innovating relevant technologies to reduce such risks and improve its products, through cooperation with universities. The wholesale and retail industry has low job quality, characterised by flat wages, low career development and absence of employees' voice; and limited innovation for several reasons, including the importance of traditional and manual elements, the huge cost of scientific research on new technology, pressures from environmental protection concerns, and employees' obedience to boss.

Chapter 8. Analysis of innovation and job quality in China

This chapter analyses the new empirical findings in relation to existing understanding outlined in chapters 2, 3 and 4 of this thesis. After a brief summary of the study's aims and objectives, the chapter examines the new findings from this research in China. It then compares these findings to other research on job quality and innovation in other contexts.

8.1 Returning to literature review

Chapters 2, 3 and 4 provided a literature review focusing on innovation, job quality, and the Chinese business system, management and employment, respectively. They provided a background for the exploration of the relationship between innovation and job quality in China.

Chapter 2 analysed the context of innovation and job quality in China from the perspective of the Chinese business system, management and employment. By referring to major theories such as varieties of capitalism (Hall and Soskice, 2001), business systems (Whitley, 2007) and four types of capitalism (Stanford, 2015), it was discovered that none of the models identified (e.g. liberal market economies, coordinated market economies, or the Asian model) suits China well. China is a unique country where situations and conditions are different from typical models in theory. Specifically, the Chinese model has changed from the old model of a planned economy to the new model of a socialist market economy, which combines a market mechanism with government involvement. Despite the profound influence of Chinese culture on organisation and management, characterised by collectivism, hierarchy and personal connections (Chen, 1995), Chinese companies are adopting a more system-based approach, which involves more autonomy and equality; this is different from the old model, which featured complete government control and decision-making. The changes to state-owned enterprises (SOEs) are typical examples. For instance, the government has decentralised decision-making and management to SOEs through contract-based systems (Lee, 1990). There is also a transition from personnel management to human resource management, which values the development of employees as important assets, instead of costs to companies (Sheldon et al., 2011). Within enterprises, greater attention has now being paid to employees. Furthermore, the new Chinese model of the socialist market economy gives priority to people's living conditions and human development (Chun, 2013). Consequently, as China transiting into a more open economy, great changes have occurred and will continue to affect the business system, management and employment in Chinese enterprises; thus these constitute an important contextual and institutional influence on innovation and job quality in China.

Chapter 3 reviewed innovation in both policy-making and the academic literature, and revealed the dominance of technological innovation in China. The Chinese government's innovation policies are oriented towards the construction of indigenous innovation by enhancing science and technology innovation; this is achieved through various related objectives concerning facilities for innovation, key industries, innovation capacity, regional innovation, and so on. In comparison, the OECD and EU's policies have a broader focus, including not only technological innovation but also non-technological innovation. There are various classifications of innovation in theory, based on different standards, such as the content of innovation (product and process innovations), degree of innovation (incremental and radical innovations), and process of innovation (DUI and

STI modes). The OECD (2010) indicates a trend that innovation is shifting from the traditional type, based on science and technology, to the organisational one, which is equally important. As China follows the *Oslo Manual* from the OECD, it is likely that non-technological innovations such as organisational innovation will attract attention in China in the future. However, at present, emphasis remains on the STI mode, as the OECD and EU still focus on technological innovation when practically measuring innovation. Furthermore, recent research indicates the link between innovation and job quality: different types of innovation can not only influence various job quality aspects, but also be affected by job quality from its intrinsic and extrinsic aspects (Yuan and Woodman, 2010; Bysted, 2013; Dailey et al., 2015; García-Buades et al., 2016; Chen, 2017; Okoe et al., 2017).

Chapter 4 highlighted that job quality is an important issue in the policy arena of key international organisations, including the OECD, EU and UN. By contrast, China does not have formal job quality policy at present, but is increasingly issuing policies and laws that implicitly encourage improvement of job quality. China has been upgrading its economic structure and is undergoing the same economic development stages that Europe had previously experienced: i.e. from extensive industrialisation to economic restructuring. As demonstrated by Europe, job creation is often overly emphasised during the period of industrialisation, sometimes with the cost of significantly reduced job quality, because governments believe that more job positions bring more productivity, thereby increasing economic performance (Drobnic and Guillén, 2011). However, mere pursuit of employment rates is insufficient for the optimisation of economic structure. It needs to be supplemented with policy oriented towards improving job quality, because higher job quality provides employees with opportunities such as better training, more autonomy, attractive wages and balanced working time (European Commission, 2012). It also offers an environment favourable for creating higher value-added output and new ideas that may lead to innovation. Therefore, due to the economic development and importance of innovation in China, job quality needs to be stressed, as it receives insufficient attention in China at present. Also, due to the absence of job quality theory and research in China, research on job quality in China is needed.

According to the summarised literature review above, innovation, particularly technological innovation, is highly stressed, while job quality has not been emphasised in China. However, discussion shows that job quality and innovation, including the non-technological type, are both important to China. Nevertheless, research on each is lacking in China. Consequently, there is a gap in understanding the overall situation of innovation and job quality in China. More importantly, recent research in different countries and contexts indicates that a relationship exists between innovation and job quality (Yuan and Woodman, 2010; Bysted, 2013; Dailey et al., 2015; Chen, 2017; Delmas and Pekovic, 2018). However, existing research commonly studies only the links between certain aspects of this relationship (e.g. organisational training and service innovation). Therefore, an overall analysis of the relationship between innovation and job quality is absent. Although the QuInnE project team in Europe is working on the issue, a gap still exists in knowledge regarding the relationship between innovation and job quality in China. For example, it is not clear in China whether innovation and job quality interact with each other, and whether there are positive or negative links between them. Therefore, this research tries to fill the gap in understanding about the relationship between innovation and job quality in China. Through the development of theoretical models drawn from statistical analysis and case studies, the research offers suggestions of better practices for levering high innovation and high job quality in Chinese enterprises.

8.2 Analysing the research findings

This section analyses the important issues arising from the empirical findings presented in chapters 6 and 7. Three themes are analysed: 1) the nature of the Chinese innovation system; 2) the reality of job quality in Chinese workplaces; and 3) the relationship between innovation and job quality in Chinese enterprises.

First, despite overwhelming innovation policies in China, the nature of the Chinese innovation system still needs to be identified for it reveals the reality of how innovation operates within the Chinese model. Chapter 2 has drawn a picture of the transitional models of China in terms of its business system, management and employment and provides important contextual elements for the understanding of the innovation system in China. It has been noted that China has transformed from a planned economy controlled by the central government to a "socialist market economy" where market mechanisms were introduced. Thus, the national innovation system framework in China has consequently evolved from state-led to a combination of state control and market dynamics.

Based on the empirical findings in this research, there is a dualism in the system resulted from the two contradictory powers, i.e. the government intervention and the market mechanism, because both of them are found to drive innovations in investigated enterprises. So a question is raised: how does innovation operate within the Chinese model? The answer to it is complicated given the dualism and diversity of actors in the system, and variations in policy orientations. The extent to which the government leads the innovation activities and the degree to which the market functions in initiating innovations vary among different sectors and industries. However, in general, innovation in public sector is more state led than that in private sector which is influenced by market forces. For example, interviewees in F1 stated that their products (e.g. mobile banking) are mainly based on the research and development from their headquarter. Although local branch (e.g. Shanghai branch) can have innovations specialised for its clients, the new ideas have to be approved first by the headquarter, the State Administration of Foreign Exchange and other relevant agencies. Interviewees in WE1 mentioned that the promotion of new projects are based on local government's support. Private sector, by contrast, functions more liberally, and is more directly affected by market. Though government retains the power to interfere private sector, it is more at the arm's length. For example, WE2 and F2 face fast-changing opportunities and challenges in the competitive market on a day to day basis, and thus have to adjust strategies regularly in order to fit the market and innovate for sustainable development. Based on the market demands, WE2 switches its suppliers and channels, and improves processes. To keep up with the times, F2 has been changing its strategic themes, from O2O (online to offline), "unicorn", C2M (customer to maker) to AI (artificial intelligence).

There is also a distinction between industries, in which some industries present a heavy reliance on government whilst other industries demonstrate the market-driven innovations. According to this research, high-tech industries rely more on government, as they enjoy privileges from the government; while other industries, receiving less support from the government, innovate from market sources. For instance, the scientific research and technical services industry (including both the state-owned and private enterprises) shows a greater reliance on government innovation policies as guidance, as well as greater benefits from government support, such as favourable subsidies, tax deductions and science park with state funding. In contrast, the finance industry and wholesale and retail industry present a greater influence by market. The bank (F1) investigated has innovations in financial products and marketing methods based on the demand from its clients. The investment enterprise (F2) investigated innovates in investment methods and business management in order to create the business group's own ecosystem which allows synergies among different industries covered by the group, thus bringing more benefits, achieving higher returns and reducing costs. The enterprises (WR1, WR2) investigated in wholesale and retail have limited innovation mainly based on its labour skills and existing technologies, and innovation is restricted due to a lack of innovation resources in the market and a high cost for independent innovation.

In addition, policy orientations at different periods result in a changing environment for innovation system in China. As noted in chapter 2, the evolution of capitalism in China started towards entrepreneurial capitalism during 1980s but was reversed in 1990s, and more recently resembles the state-led capitalism that prevails in Latin America (Huang, 2008), as there is more government control. Thus, the power within the innovation system varies in different periods due to contextual institutions.

Despite the variations in China's national innovation system, it should be stressed that the Chinese government plays a dominant role in guiding the direction of technological innovation and allocating resources, whilst market mechanism functions in non-governmental areas and in initiating market-driven innovations. Therefore, instead of a pure market-driven model of innovation or the often-assumed state-led model of innovation, the innovation system in China is driven by a combination of the state and the market.

Given the dualism of China's national innovation system, there are both strengths and risks of such model. On the one hand, government provides support for innovation, including science and technology support, subsidies, tax rebates etc., and can direct the vocational training system and human capital formation, making up the areas where market failure is likely to occur. On the other hand, state-led innovation has a potential risk of marginalising other sectors in society because major resources are centralised and put into certain areas which are emphasised by the state. Other sectors, which are more market-based, are left with less resources and innovation is difficult. In regard to China having single party system, it has an advantage of high efficiency in implementing projects and tasks required by the government, because all resources in society can be mobilised and integrated shortly to facilitate such missions. But the system can lack checks and balances at the same time, which is risky because problems can occur if the government's direction is wrong. There is also culture problem which has been linked to the persistence of Confucian values, stressing obedience to hierarchy and harmony (Appelbaum et al., 2018). Case studies present evidence on cultural issues rooted in enterprise management that can affect innovation. While innovation in WR1 is discouraged due to strong hierarchy in the organisation in which leader speaks and employees follow instructions, innovation in WE2 is encouraged due to flat organisational structure, delegation and employees having their voice. Therefore, organisations that have a culture of obedience to hierarchy have difficulty innovating. This research challenges the existing knowledge of the profound impact from traditional Confucian culture, by showing two contrasting cases and indicating that some leaders in Chinese enterprises are adopting new organisational culture contrary to traditional one. And different management styles are proved to have distinctive effects on innovation. Unlike the traditional one, the new management style, featuring flat structure and delegation, has been adopted in some Chinese enterprises and is favourable for innovation.

The dominance of technological innovations in Chinese enterprises are consistent with the government policies which place science and technology innovations at the centre; and the science parks, subsidies and tax deductions, and triple helix evidenced in case studies show that government measures in building innovation facilities, providing financial support and promoting industry-university cooperation are enacted.

Compared to the existing literature and policies on China's innovation which focus on the technological type, this thesis also explores the wider innovations and extends the knowledge by showing different examples of non-technological innovation in Chinese enterprises. Evidence from case studies indicates that enterprises also have non-technological innovations which are important to their development. For instance, enterprises in the scientific research and technical services industry upgrade business models by introducing platforms to increase their business range and the efficiency of service provision. Following government's direction of centralising resources to achieve science and technology breakthroughs, they restructure their organisation through resource integration in order to acquire strengthened cooperation between departments and triple helix. There are innovations in management in the water conservancy, environment and public facilities industry, e.g. reform of wage structure, delegation of power or innovative stimulating workplace policies in order to motivate employees to do better jobs, business collaboration with government and different types of enterprises to acquire more resources and extend business capacity. Enterprises in the finance industry innovate visionary business ideas that suit their own conditions and benefit future development, e.g. creating an ecosystem within the business group that allows synergies between different industries it covers. There are also workplace innovations initiated by employees in the industry, and new technologies were found to facilitate marketing and organisational innovations, e.g. use of the internet and smartphone app to realise online banking and internal organisational management. The wholesale and retail industry has marketing innovations as sales channels are extended to include both online and offline presence, as well as various marketing activities to approach potential customers. According to this thesis, the real innovations in China also comprise non-technological ones, which are neglected by previous research and policies. Previous research that statistically analyses innovation in China only involves indicators of technological innovation (Motohashi and Yun, 2007; Li, 2009; Fan, 2014; Zhou et al., 2016; Wen et al., 2018). Consequently, the absence of the wider types of innovation indicates that the existing research and policies, as well as measuring indicators, are insufficient respectively in evaluating, directing and assessing the overall innovation in China. In addition, the organisational innovations discovered in this thesis echo the trend identified in the literature review, that a more open, delegated and employee-valued business system is emerging in China.

Second, given the missing concept of job quality in China and limitations in relevant data, it requires a discussion of the reality of China's workplaces in order to better understand job quality and the reliability of what happens in these workplaces as represented in official statistics. As no prior study has been conducted in China that systematically investigate job quality, this research shows the overall job quality in different Chinese industries and enterprises. Statistical analysis presents different levels of job quality across industries, and case studies further identify a distinctive contrast between state-owned and private enterprises regarding job quality. However, it should be noted that besides the differences, there are overtime working, casualisation and government control over industrial relations, commonly observed in China; these respectively affect the working hours, job security, and autonomy and social dialogue dimensions of job quality. These problems hinder the trend identified in literature review that policies and laws are made to improve relevant aspects of job quality in China.

With respect to overtime working, this phenomenon is commonly found in the investigated case studies, especially in project-intensive industries (e.g. water conservancy, environment and public facilities), private enterprises (due to pressures from market), and business departments (contrary to administrative positions where working hours are fixed). Although legislation allows for 44 hours per week and restricts overtime, in reality there is overtime working and relevant standard is hardly met. For example, the regular working hours in F2 is from 9am to 7pm five days a week—that is 50 hours per week; this doesn't include extra hours. In business department, working overtime is very often, so employees work later than 7pm; this means over 50 hours a week. In project-intensive industries, evidence shows that workers work long hours continuously at construction sites until the completion of the project when they could have some holidays. Both the state-owned and private enterprises indicate overtime working, but differences exist in terms of frequency and attitude. The phenomenon is less frequent in SOEs than private enterprises. Although SOE employees sometimes work overtime, they clarify that their organisations do not encourage this. In comparison, private enterprises prefer overtime working to increase productivity as they face more pressures and competitions from the market. Despite a growth in output, long working hours are reported to worsen employees' work-life balance as their private life is reduced and degraded due to stress and tiredness resulted from too much overtime working, which harms employees' well-being. Consequently, despite relevant legislation, overtime working is still common and decrease the job quality of employees in China.

Besides the violation of working hours legislation, there is casualisation at China’s workplace, occurring in both public and private sectors. On the one hand, the shortening of labour contracts increase job security concerns. Compared to the “iron rice bowl” in the old system, SOE employees nowadays no longer enjoy lifetime employment. There is higher labour mobility than before. In private enterprises, the condition is even worse as jobs are very competitive and based on the performance. For example, it is common that employees, especially those at lower positions, only work for one year in F2. Employees who have stayed for five years are very rare. On the other hand, the enforcement of formal employment is sometimes weak, characterised by the employment of temporary workers. This is more common in the water conservancy, environment and public facility industry as both the SOE and private enterprise hire temporary workers for on-site construction work, although the number is smaller than that of formal workers in interviewed enterprises. As project work is not on a day-to-day regular base, so enterprises prefer to hire temporary workers for certain period to save cost. In other industries investigated, temporary workers are not so dominant, because formal employees are regarded to be more important and key in the organisations. Thus, the qualitative research focuses on regular employees. The research findings reveal the situations in formal employment for formal employees. The experience of temporary workers was not investigated. This focus is typical in China: national statistics only include formal employment situations and fail to capture the conditions of informality, which are found in this study and other research in China (e.g. Lin, 2015; Liu and Smith, 2016).

In addition, there is government control over labour relations, which inhibit formal collective bargaining in China, thus affecting the autonomy and social dialogue dimension of job quality. Literature shows that in China, the official trade union, controlled by the government, does not function in the same way as its Western counterparts do. The collusion between trade union leaders and the state has weakened its function of representing workers (Chan and Hui, 2016), and the lack of rights to strike and independent orgnisation also hinder its associational power (Wright, 2000). Despite the government intervention at all levels, Brown and Kai (2017) confirm the union's role in achieving pay increases and drafting legislation, and its duty to maintain social order and protect and advance the rights of workers. They do not regard the union to be powerless in defence of worker interests but believe its proximity to government not only provides other means of influencing employers but also enables it to be effective mediator when strikes break out. Besides trade unions, labour NGOs become increasingly isolated and atomised, due to the repressive state-led institution (Franceschini and Nesossi, 2018).

According to case studies in this thesis, SOEs have trade unions but they belong to the Party and mass work department, meaning they are under the leadership of the Party. Therefore, instead of purely representing workers, trade unions also monitor the dynamics of industrial relations and deliver the government intention. Despite this, trade unions in SOEs formally organise staff congress, which aims to hear from employees and improve their work and treatment. In contrast, private enterprises seldom have formal trade unions or staff congress like SOEs do. Instead, they prefer informal means including meetings, private communications and negotiations, when employee raise issues. The degree of autonomy and social dialogue is very much based on CEOs' choice, because there is no formal organisation or mechanisms to ensure that. As noted above, government controls trade unions and prevents the development of other independent labour NGOs in China. As a result shown in this study, the private sector, receiving less support from the government, is less likely to form formal trade unions, thus hindering the autonomy and social dialogue dimension of job quality. Therefore, by taking the contextual institution and reality at workplace into consideration, it can be inferred that due to the strong government control over industrial relations, gaining government's support is important in China, as this enables enterprises to have formal trade unions and organise activities for social dialogue. Otherwise, without the support from government, relevant objectives are difficult to achieve. Thus, in other words, government control has prevented trade unions from representing workers in private sector; this challenges the goal of trade union law and government policy identified from literature review.

Apart from the problems identified, there are some improvements of job quality in China according to case studies. Changes have been made in management, such as improvement of wage structures to add performance-based credit in order to motivate employees and improve their earnings. There is more delegation of power in organisation, thus increasing employees' autonomy. Emphases on regular training and qualification requirements help employees improve relevant skills for doing better job.

Overall, besides the variations in job quality among industries, sectors, organisations and work positions, there are common features of overtime working, casualisation and government control over industrial relations in Chinese enterprises, as well as improvements in wage structures, autonomy and skills, which affect different dimensions of job quality.

Third, concerning the relationship between innovation and job quality, this research identifies a two-directional positive relationship between the two, with both direct and indirect interactions in Chinese enterprises. As no prior study has been done in this area, this research is the first study to explore the overall relationship between innovation and job quality in China, which considers different types of innovation and dimensions of job quality, as well as complex interactions between them. This research also proposes original theoretical models that help understand the relationship between innovation and job quality. It not only explores various direct and indirect impacts on job quality by different innovations, but also reveals different job quality dimensions' roles in encouraging innovation.

According to the case studies in this research, some Chinese enterprises have adopted incentive strategies with internal policies linking innovation to job quality in order to promote innovation through improved job quality. CEOs interviewed have realised the importance of improving employees' job quality in promoting innovation. For employees, they view higher job quality brings better conditions for them to innovate. Therefore, in practice and from both views of leaders and employees, a positive link between innovation and job quality have been proved in Chinese enterprises.

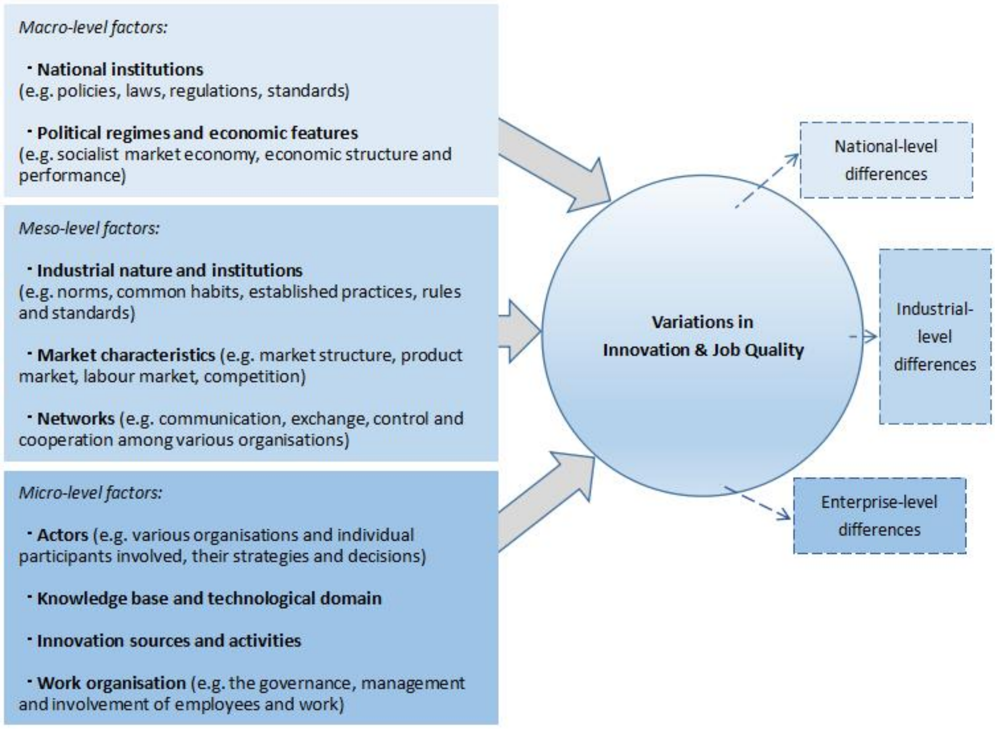
However, as better job quality promotes innovation, it should be noted that the problems of overtime working, casualisation and government control over industrial relations discovered at Chinese workplaces need attention because they lower job quality. Evidence from interviews shows that a job with secure employment, less pressure and more autonomy is beneficial to innovation because employees can thus focus on their work, have essential space for thinking about new ideas and be able to express and achieve innovations. Consequently, it is important to improve job quality, as currently relevant problems exist and can hinder innovation in enterprises.

Reversely, from the perspective of innovation's influence on job quality, this research indicates a distinction between technological and organisational innovations, as the former often affects job quality indirectly through various mechanisms such as improved performance and profit, while the latter tends to impact on job quality directly. For example, innovations on wage structure and training arrangement within an organisation can improve job quality directly. This thesis argues that the reason for such distinction is due to a higher convergence between job quality and organisational innovation than technological innovation. As organisational innovations involve changes to workplace practices relating to aspects of job quality, thus such type of innovation is more likely to link with job quality directly. In comparison, technological innovation often aims at improving products and processes, so is less likely to have direct impact on job quality. But as technological innovation commonly results in higher business performance or management efficiency which link to jobs and treatment in the same enterprises, such type of innovation can generate indirect mechanisms that finally improve job quality.

Given the positive relationship discovered between innovation and job quality, a question is raised as there are different configurations between innovation and job quality evidenced in both statistical and case study analyses. For example, some industries show both high or low innovation and job quality levels, while others display high innovation with low job quality or low innovation with high job quality. This thesis argues that despite an overall positive interaction between innovation and job quality, innovation and job quality are shaped by multiple factors that explain the variations in innovation and job quality in the study. Also, as noted in chapter 7, the positive impacts between job quality and innovation are based on a condition that innovation is encouraged in the enterprises, and certain incentive strategies need to be implemented in order to create a virtuous cycle between innovation and job quality. Therefore, in reality, the impacts between innovation and job quality can be reduced when innovation is not encouraged and relevant strategies are absent.

According to this research, the variations in innovation and job quality in China are shaped by multiple influential factors, including macro-, meso-, and micro-level elements (see Figure 8.1). The macro-level elements are national institutions, including policies, laws, regulations and standards, and political and economic features such as the socialist market economy and economic structure. The meso-level elements contain industrial nature and institutions, market characteristics and networks. The micro-level elements include actors, knowledge base and technological domain, innovation sources and activities, and work organisation. Figure 8.1 is an input and output model summarising the three-level factors that impact on innovation and job quality respectively in China; as a result, this generates three-level differences, including the variations in innovation and job quality across countries, industries and enterprises.

Figure 8.1 The multilevel factors affecting variations in innovation and job quality in China



The three-level factors, including macro-, meso- and micro-level factors in the diagram, have influences on both innovation and job quality. For example, at the macro level, the Chinese national innovation policies promote the scientific and technological innovations, and the national labour laws and regulations set minimum standards for several aspects relating to job quality in China, e.g. working hours and wages. The Chinese characteristic of the socialist market economy also provides an important context for the innovation and job quality in China, resulting in innovations being partly led by the government and partly driven by the market; while job quality varies between the public and private sectors, where the former is relatively more stable and fixed, whereas the latter is less stable and more flexible.

At the meso level, innovation and job quality vary due to factors of industrial nature and institutions, market characteristics and networks. For instance, the innovations from the four industries interviewed are different, as the nature of the industry and relevant institutions are distinctive: e.g. innovations in science, technology and technical provision, in the scientific research and technical services industry; whilst in the finance industry, innovations in the provision of more efficient financial services and beneficial investments. The nature of the industry and relevant institutions also affect job quality, as interview evidence shows, for instance, the relatively lower level of job safety in the industry of water conservancy, environment and public facilities due to potentially risky construction work and exposure to harmful chemicals. However, safety rules and regulations can improve job safety, because higher safety standards are required. The market characteristics, including market structure, product and labour markets, and competition, are another meso-level factors shaping innovation and job quality. There is a distinction between public and private sectors, where the former is dominated by large state-owned enterprises, whilst the latter contains various types of enterprises in the market, including large, medium and small-sized private enterprises. Therefore, the market structure and competition are different, leading to the variations in innovation and job quality: for instance, innovations led or permitted by the government in the public sector, and innovations driven by market competition in the private sector; better-ensured jobs in the public sector, while fluctuating job quality in the private sector. The third meso-level factor, networks, also results in variations in innovation and job quality in China. For example, the scientific research and technical services industry, and water conservancy, environment and public facilities industry have close cooperation with universities and research institutions, which promotes their technological innovations. In other industries investigated, there are collaborations across industries, public and private sectors, and different sizes of enterprises; these lead to organisational innovations, benefiting both enterprises (e.g. more resources and investments) and employees (e.g. products and welfare from partner enterprises).

The micro-level factors refer to elements relating to individual decisions and firm-level differences that shape the innovation and job quality in China, including actors, knowledge base and technological domain, innovation sources and activities, and work organisation. In terms of actors factors, the leader and manager's decision affect the top-down innovations and the job quality in the company, while the suggestions from employees facilitate bottom-up innovations and help improve the employees' job quality from their own perspectives. The second micro-level factors, namely different knowledge bases and technology domains, differentiate innovations and job quality, as they influence the content of innovation and the application of technology to improve job quality. For instance, the scientific research and technical services industry is based on the advancement of science and technology, while the water conservancy, environment and public facilities industry is based on the improvement of techniques to provide more effective and less harmful chemicals and equipment that can be used in society. The finance industry is related to financial knowledge, market and clients, while the wholesale and retail industry interviewed relies on traditional and labour skills. Thus, different innovations develop from distinctive knowledge bases and technological domains across industries. Regarding technology's influence on job quality, the application of an online communication and work system in the case studies, for instance, improves employees' work efficiency and changes their way of working. The third micro-level factors, including innovation sources and activities, also shape innovation and job quality. For example, the industry of scientific research and technical services depends on science and lab experiments and research, while the finance industry relies on the advancement of technology and employees' creative ideas to improve various innovations, such as process, product and organisational innovations. The innovation sources and activities, through which companies accept and adopt new ideas created by employees, improve the autonomy and social dialogue, as well as increasing employees' benefits when they are rewarded. Finally, the fourth micro-level factor, the work organisation, plays an important role in both innovation and job quality, because the governance, management and involvement of employees and their work influence how innovations are achieved and how jobs are organised within the particular organisation.

Considering the three-level factors and variations in innovation and job quality discovered across industries and enterprises in China, this thesis argues that meso- and micro-level factors are intrinsic elements to the variations, while macro-level factors are extrinsic elements to the variations. On the one hand, industries and enterprises have distinctive conditions due to their characteristics, which shape innovation and job quality. On the other hand, national policies, political regime and economic features also impact on industries and enterprises in innovation and job quality. The special emphasis on particular innovations (STI) and industries in Chinese policies triggers innovation and job quality differences across industries: high-tech industries receive favourable support for achieving innovation and improving job quality while others do not. Due to socialist market economy and single-party system in China where resources are centralised, there is a distinction between state-owned and private enterprises, with imbalanced state-led and market-driven features, leading to differences in innovation and job quality as demonstrated in above discussions on innovation and job quality. Besides, macro factors also play a role in the national-level differences, such as between China and EU countries reviewed in literature, as Chinese policies stress science and technological innovation while EU policies encourage broader innovations.

Previous literature highlights certain aspects that affect innovation and job quality separately, but they are not sufficient and this research identifies more factors evidenced to be relevant to both innovation and job quality in China. For example, the techniques of using R&D expenditure to differentiate innovation capacity is useful but not conclusive, because it is difficult to capture non-technological innovation. Schumpeter's theory provides a helpful view to understand innovation differences rooted in the market structure and industrial dynamics, but the two models (Schumpeter Mark I and Mark II), representing the first industrial revolution and the second industrial revolution, are not typical for Chinese industries. The technological regimes and innovation sources theories (Nelson and Winter, 1982; Pavitt, 1984) focus on the intrinsic aspects of innovation, but other factors have been found to impact on innovation as well. The "five forces" framework by Porter (1979 & 1985) offers effective approach to analysing a firm’s strategy and innovation when faced with market competition, but it neglects the cooperation between organisations, which also promotes innovation. While Malerba (2005) proposes a comprehensive approach to analyse sectoral differences in innovation through elements of knowledge and technology, actors and networks and institutions, this research develops a framework by including factors at all levels.

In job quality-related literature, little research systematically studies its variations as a multi-dimensional construct. Different factors were identified to be influential to job quality. For instance, there have been discussions on national institutions, economic modes, sectors and job markets, and practices and strategies’ impacts on work and labour (Smith and Meiksins, 1995; Carré and Tilly, 2012; Wright, 2015). Emphasis varies in different contexts: political and economic arrangements are stressed in the state socialist context, while employment regimes are important in capitalist contexts (Smith and Thompson, 1992; Gallie, 2007). Besides, other factors including laws and regulations, work organisations and actors, geographies, and sociological and psychological aspects are noted (Warhurst et al., 2012; Frenkel, 2015; Murray and Stewart, 2015; Quinlan and Bohle, 2015; Weller and Campbell, 2015).

Compared to the existing literature, a strength of this research is its use of a holistic approach that considers different-level factors. As the relationship between innovation and job quality is new research topic in recent years, this research applies inductive approach to framing a systematic model for analysing factors shaping innovation and job quality—this is an exploratory model instead of explanatory one, which draws the significance of factors through hypothetico-deductive method.

Finally, to evaluate the innovation and job quality indicators selected in this research, there is a question of whether the indicators over-simplify a complex relationship between innovation and job quality, as discussions show the complexity of the topic. Due to the problematic nature of indicators, weaknesses of formal statistics and variations in contexts, the exploration of the relationship between innovation and job quality is not easy. Firstly, as innovation is a sophisticated system and job quality is a complex multi-dimensional construction around which there is no consensus on how they could be best represented, the selection of indicators is controversial. Different disciplines have different perspectives and tend to focus on distinctive aspects using different indicators (e.g. as discussed in chapter 4). Secondly, the weaknesses of formal statistics in China prevent the research from collecting ideal data, as some parts of data are absent for detailed analysis. For instance, the non-technological innovation data are lacking. There is not enough job quality data, for example on work-life balance, autonomy and social dialogue, and skill utilisation (except for educational attainment) at industry level. Thirdly, there are also contextual differences between sectors, cultural and historic factors. Some aspects can be particularly important in certain context, while in different context, other aspects can be more prominent. For example, the case studies in this research indicate that private enterprises have more serious problem around overtime working, while in state-owned enterprises such issue is not significant. In the water conservancy, environment and public facilities industry, enterprises hire temporary workers regularly to do construction and engineering jobs on site, whilst in other industries investigated, temporary workers are not so common. Therefore, different contexts can have different emphases on the indicators.

Nevertheless, it should be noted that rather than insisting on particular discipline’s tradition or confined by data limitations or focusing on specific context, this thesis achieves flexibility and suitability by applying pragmatism approach which adopts mixed methods to address specific inquiries. This research has managed to establish two sets of measuring indicators, being comprehensive yet manageable to capture innovation and job quality, based on the data availability in China. The indicators in statistical analysis are simplified yet inclusive to cover important aspects based on the national statistics in China. Regarding indicators in interviews, extra data are also explored to supplement the analysis. For example, questions around marketing and organisational innovations were asked. To understand work-life balance aspect, interviewees were firstly explained of the concept, then asked to think about their working time arrangements, work intensity, balance between their work and private life, and whether current conditions promote positive personal development. Besides educational attainment of employees, information about skill utilisation including qualifications and types of skills required, training and development were gathered. Besides, the semi-structured interview style works effective in both collecting common information required by the models for comparison and exploring distinctive features in particular enterprises for in-depth understanding, thus discovering needs for attention to different aspects across industries and enterprises, due to different contexts.

Given that relevant theory is absent and an inductive approach is applied, there are advantages of the newly established exploratory model of the relationship between innovation and job quality in this research, as it extends the knowledge of this topic, explores more mechanisms that are missing in previous research (see discussion in section 8.3). But limitations exist as it is only based on eight cases in four industries, making it more referable to certain industries, enterprises and employees. Thus, there is a need for more research to test and improve the model developed in this thesis.

8.3 Discussion of the findings in relation to other studies of job quality and innovation

The previous section has critically analysed the findings of this study. This section discusses these findings in relation to relevant research of other countries.

It is important and helpful to understand the relationship between innovation and job quality when considering the Chinese policy orientations and the changing model of China because the above factors constitute an influential context for the development preferences of enterprises in China. Both the literature review and the empirical findings in this research suggest that Chinese policies encourage innovation. For instance, the interviews in China reveal that fiscal policies from the Chinese government, including favourable tax rates and subsidies for high-tech enterprises, encourage enterprises to achieve more innovations. In addition, with the transition from personnel management to human resource management, in which the value of employees is recognised and emphasised, more resources and attention are being directed towards employees, thus favouring an improvement in employees' treatment and fostering of talents. In such a background that encourages innovation and employees' value, this research discovers the two-directional positive relationship between innovation and job quality in China, where both direct and indirect impacts are found. Also, due to the distinctive characteristics of the industries, there are variations in both innovation and job quality across industries, resulting in different configurations between innovation and job quality levels among industries in China. Nonetheless, it is commonly consistent that higher innovation triggers better job quality, and vice versa; therefore, with certain incentive policies that link the two within organisations, innovation and job quality can work together and promote each other, thus creating a virtuous cycle.

Similarly, the Europe-focused QuInnE research indicates a virtuous circle between innovation and job quality, as they reinforce and complement each other (Jaehrling et al., 2018). There are similar different configurations between technological innovation and job quality levels in different industries in Europe. Apart from industries with similar characteristics in both regions, such as the IT industry, other industries are populated into different quadrants in QuInnE, compared to this research in China. For example, the hospitals industry in Europe is labelled as high innovation and high job quality, while the health and social services industry in China has low innovation and high job quality. The finance industry in China has low innovation and high job quality, but the banking industry in Europe is high in both innovation and job quality. Moreover, the QuInnE project observes the general association between innovation and better employment quality; but it simultaneously finds that the adoption of new technology can lead to high workplace risk and work-time intensity (Mofakhami et al., 2018), which has not been discovered in this research in China. Furthermore, as Warhurst et al. (2018) point out, employee-derived innovative capacity is an essential requirement for the interaction between innovation and job quality. According to Warhurst et al., the relationship created between innovation, job quality and innovation capacity can lead to either a virtuous circle or a vicious circle, depending on mediating factors such as competitive strategies and managerial choices, human resource management and innovation management. In comparison, the research in China finds a consistent positive relationship between innovation and job quality, although analysis has identified some problems at Chinese workplaces that can hinder job quality and innovation. The overall positive relationship observed is related to the current policy and Chinese economy, management and employment, which favour both innovation and talents in China. Therefore, such institutional conditions enable innovation and job quality to interact positively in China. However, the research in Europe draws attention to the potential negative factors that might convert the virtuous cycle into a vicious one. Hence, further research can be conducted concerning this issue in China.

In terms of the specific mechanisms between innovation and job quality, the findings in this thesis are similar in some ways to the research by Muñoz-de-Bustillo et al. (2017), who investigated the relation between innovation and job quality at firm level among 32 European countries through quantitative analysis of European Company Survey (ECS) data. However, some differences exist between the studies' findings. First, both researches indicate that there are different mechanisms in the relationship between innovation and job quality. The model generated by Muñoz-de-Bustillo et al. presents four transmission mechanisms that relate innovation and job quality. The first three mechanisms describe innovation's impact on job quality through increase in productivity, change in the production process, and structural change respectively, while the fourth mechanism states that job quality can in turn promote innovation. The findings of this research regarding mechanisms that drive innovation to affect job quality are similar to the previous study but this research develops this aspect further, as both direct and indirect impacts are considered, and more mechanisms of job quality's impact on innovation are explored. Second, both studies discover that the impact of innovation on job quality differs by types of innovation. Muñoz-de-Bustillo et al. conclude that process and product innovations (in this order) and marketing innovations have a greater influence on job quality, while organisational innovations do not have a statistically significant impact on job quality. In comparison, this research also shows the importance and dominance of technological innovation (including product and process innovation), as well as its various impacts on job quality. However, instead of examining the significance of impacts, this research shows the variety of impacts by types of innovation; it indicates that technological innovations tend to affect job quality indirectly through different mechanisms; whilst organisational innovations, especially those relating to jobs (e.g. innovations on wage system and training), are more likely to have a direct influence on job quality, though this distinction is not absolute. This difference has not been mentioned in the previous literature. Third, both studies indicate the two-directional positive relations between innovation and job quality. However, due to the limited data provided by the ECS, Muñoz-de-Bustillo et al. fail to investigate "the causality between the variables or the possibility of having mutually reinforcing dynamics" (p.21). However, their theoretical model suggests that this relationship exists. Similarly in China, relevant statistical data are limited. Nevertheless, this research, in contrast, manages to explore the causality and the two-directional relationship between innovation and job quality, through qualitative interviews. Unlike the approach of quantitative analysis, which explains the relations through calculation of observed statistics (e.g. presented by correlation and significance), the qualitative approach adopted by this research investigates and explains the relationship through subjective understanding. Moreover, this research also expands the knowledge of the relationship between innovation and job quality in the existing literature, as a more comprehensive study is conducted, covering different types of innovation, various aspects of job quality, and different mechanisms in their interactions. Prior research has only studied certain types of innovation and limited aspects relating to job or work (e.g. Dailey et al., 2015).

Reversely, regarding job quality's impact on innovation, the research by Muñoz-de-Bustillo et al. (2016) indicates two opposite mechanisms that explain the existence of a positive relation between job quality and innovation: the first mechanism involves job quality's role in incentivising productivity through increased employee identification with the company, whilst the second mechanism translates good working conditions into higher unit labour cost, which pressurises companies to improve productivity through innovation. In comparison, this research also indicates a positive relationship but considers job quality's impact on innovation through a different approach based on the analysis of each job quality dimension; this is because the dimensions have been proved in this research to function differently in promoting innovation. Therefore, this research identifies the distinctive roles played by different job quality dimensions in the process of innovation generation, adding new knowledge to the existing literature. Some findings in this research are consistent with previous literature: for example, the positive relationship between organisational training and service innovation performance (Chen, 2017), and knowledge-sharing and workplace friendship promoting service innovation (Okoe et al., 2017). However, this research extends the understanding further, because more aspects of job quality are considered and more relations are found.

The qualitative research conducted at company level by QuInnE also indicates a diversity among companies and industries, as different strategies are adopted as a response to challenges. However, it summarises that the factors of value chain restructuring, skill and labour shortages, tight public budgets and the ageing workforce are important to innovation and job quality, as discovered from case studies. According to Jaehrling et al. (2018), while value chain restructuring affects companies' innovation strategies through improvement of their position in the value chain by developing higher value added products and services, as well as an increase in employee involvement, the skill and labour shortages encourage employers to improve job quality, in order to attract and retain scarce workers. The unsatisfactory wage levels and amplified recruitment problems, caused by tight public budgets can motivate companies to seek organisational innovations that improve other aspects of job quality. The ageing workforce can trigger the implementation of job rotation in companies as a way to reduce physical strain; but in the context of increasingly taylorised workplaces and strong pressures to remove "down" times, job rotation also cuts forced breaks and leads employees to rotate between highly repetitive tasks.

In comparison, despite different conditions, similar factors also exist in China concerning value chain restructuring and the ageing workforce, in which the former features a change towards high-value added products and services, and the latter leads to changes in employment. For example, the workforce profile is older; job quality becomes more important than quantity and low cost.

From the perspective of global value chains (GVCs), there has been discussion on emerging economies' high road/low road development; and social upgrading and downgrading along value chains, in which countries seek to locate themselves in the globalisation by choosing different paths for development, and power (including market, corporate social responsibility, multi-stakeholder, labour, industrial cluster and public governance) within value chain continues to situate them (Gereffi and Lee, 2014). Relevant to value chain, Coe and Yeung (2015) introduce a concept of Global Production Networks (GPNs) as a new form of economic organisation which has emerged due to the economic globalisation.

According to the theory of GPN, the strategies of economic actors and their consequences for uneven economic development in different regional and national economies are explained by three dynamic drivers of value activity in GPNs, i.e. optimising cost-capability ratios, sustaining market development, and working with financial discipline. Through GPNs, the competition and cooperation for a larger share of the creation, transformation and capture of value are achieved through transnational economic activity. Based on the above literature, it can be inferred that the economic globalisation, especially the GPNs, constitutes a contextual background that shapes the strategic development and value chain restructuring of a country.

China, famous for its manufacturing, has been continuously upgrading its economic structure, moving from cost-based to quality-based one. This is achieved through a transition from the cost-cutting production, characterised by low-labour costs and competitive prices, to the better quality-focused innovations, with high-value added products and services. The route of China's transition and improvement in GVCs can be traced back to the reform and opening-up during the late 1970s, when the country started to attract foreign investment and cooperate with foreign companies, thus beginning to participate in the GVCs. However, the Chinese firms at that time was under-developed, with low technology and skills. The only solution was to compete on cost, by offering low-cost labour and materials, and often situated in the low value-added production section. But gradually, through many years of working together with foreign companies, Chinese firms had introduced a series of advanced technologies and learned modern enterprise management systems from the lead firms abroad, as well as accumulating valuable experience and capability from transnational economic activities. The involvement in the GVCs has been an important factor for the development of Chinese firms and their positioning in the future. In order to promote economic and social upgrading, China has been improving its position in the GVCs towards a high road development, whilst leaving the original mode of low-end manufacturing to other developing countries, e.g. India leather clusters, characterised by cutting labour costs and jobs often being low-paid, informal, with undesirable working conditions (Damodaran, 2010). China, for example, has become a leader in superconductor, large-scale water-turbine generator set manufacturing, and in aerospace (Ding and Li, 2015). Consequently, the contextual factors of value chain restructuring and relevant economic development explain China's transition towards enhancing higher innovation and better job quality, as innovation are high value-added and job quality needs improvement to facilitate high road development.

The special conditions in China constitute a favourable environment for promoting job quality and innovation. The government stresses and encourages high-level talents; this leads to the improvement of employees' skills and development, as well as other treatment of employees and their involvement in organisation, the important aspects of job quality; it also increases the potential for innovation, as their knowledge base and innovation capacity develop. Unlike the European countries, where public budgets are tight, China continues to increase spending on innovation resources, ranking second in total R&D funding, and being the global leader in terms of total R&D personnel (Li, 2017); it thus provides a favourable environment for the improvement of both innovation and job quality. Therefore, different conditions in Europe and China generate distinctive mechanisms, but ultimately lead to a similar outcome in general: that is, more innovation and a better quality of jobs. Furthermore, this research agrees with the final point made by Jaehrling et al. (2018), who recommend simultaneously diverse and partial responses to the challenges faced by companies, and the resultant winding paths of company development, instead of framing company responses as a coherent set of strategic choices, because differences are shaped by various factors including structural, economic, institutional and culture ones (e.g. management styles; power resources and attitudes of trade unions, national training systems or corporate governance).

8.4 Conclusion

This chapter provides comprehensive analysis on the research conducted. Based on the findings from this research, as well as relevant literature, in-depth discussion has been made in terms of three aspects, including innovation, job quality and their relationship. The discussion of innovation reveals the dualism and diversity Chinese innovation system has. The dualism refers to the co-existence of two contradictory powers, namely the government intervention and the market mechanism, in the system. And the extent to which they drive innovation varies across sectors and industries, thus showing a diversity. Through evaluation, the Chinese innovation system has both advantages and disadvantages, considering China having single party system. These include strengths in government's direction and financial support for technological innovation, vocational training and human capital formation, as well as high efficiency in implementing what the government wants; but there are risks in lacking checks and balances of the system, marginalising other sectors in society, and cultural problem which discourages innovation.

Regarding job quality, the common features of overtime working, casualisation and government control over industrial relations indicate the actuality at China's workplace, apart from the variations in job quality across industries and sectors. While overtime working affects the working hours and work-life balance dimension of job quality, casualisation reduces job security as enterprises hire more temporary workers and labour contracts are shortened compared to the past. Government control over industrial relations impacts on autonomy and social dialogue, leading to the special role of trade unions, as well as the importance of gaining government's support in China. Besides, aspects of wage structures, employees' autonomy and skills tend to be improving in Chinese enterprises.

This research finds a two-directional positive relationship between innovation and job quality in which different innovation types and job quality aspects are considered. While both leaders and employees indicate a positive relationship and relevant strategies have been adopted in Chinese enterprises to improve innovation and job quality, attention should be paid to the problems identified at Chinese workplaces which can hinder job quality and innovation. As organisational innovations have higher convergence with job quality than technological innovations, such type of innovations tend to affect job quality more directly. Despite an overall positive relationship, this thesis identifies three-level factors on the variations in innovation and job quality in China. Given the problematic nature of indicators, weaknesses of formal statistics and variations in contexts, the relationship between innovation and job quality is complex. Despite the absence of relevant theory, this research manages to establish innovation and job quality indicators being comprehensive yet manageable to explore their relationship based on the data availability in China. Through an inductive approach, exploratory models of the relationship between innovation and job quality are proposed and help understand the topic.

Through comparison with the previous literature, the significance of this study’s findings is interpreted and evaluated in light of what is already known and what is currently unknown. This research has produced some similar findings to those of prior research but improves the understanding of innovation and job quality. On the one hand, the findings are consistent with the previous literature in some aspects. First, technological innovation is dominant in China; this echoes the Chinese policy and research identified in the literature review, which indicates that science and technology innovation is at the centre of the Chinese economy. Second, the organisational innovations and job quality discovered in the interviews are consistent with the trend identified in the literature review, that a more open, delegated and employee-valued business system is emerging in China and aspects of employees’ wages, autonomy and skills are improving. Third, the contrast between relatively higher job quality in SOEs and lower job quality in private enterprises traces back to the historical reasons presented in the literature, whereby the former evolved from the “iron rice bowl”, while the latter faces more market competition and pressure. Fourth, this research finds different mechanisms within the relationship between innovation and job quality, especially those driving innovation’s impact on job quality, which are similar to the theoretical model established by Muñoz-de-Bustillo et al. (2016). It also finds a two-directional positive relationship between innovation and job quality, which is consistent with the research conclusion by Muñoz-de-Bustillo et al.

More importantly, on the other hand, this research adds new knowledge to the existing literature. First, it extends the understanding of China’s innovation system by showing that innovation is driven by government and market, two contradictory powers which vary across sectors and industries in China. It indicates a neglect in policy and research regarding non-technological innovation, because policies and research in China focus on technological innovation; whereas this research finds dynamic non-technological innovations in Chinese enterprises. Therefore, innovation needs to be reconsidered in China, as other types of innovation are overlooked. Second, given the absence of job quality concept in China, this research investigates job quality in different Chinese industries and enterprises. The features of overtime working, casualisation and government control over industrial relations discovered at Chinese workplace challenge the views identified in literature that laws and policies are implemented to ban excessive working hours, encourage longer-term labour contracts, and enable trade unions to better represent workers. The official labour statistics in China present formal employment but fail to provide temporary employment information which is indicated in the case studies in this research. Third, compared with previous relevant studies which commonly focused on a certain type of innovation or limited aspects of job quality, this research conducts a more comprehensive investigation by considering different types of innovation, various indicators of job quality, and the complex interactions between them. This research is the first study to explore the overall relationship between innovation and job quality in China. Fourth, this research establishes exploratory models that help understand the relationship between innovation and job quality. It extends knowledge about the variety of impacts according to types of innovation, and indicates that technological innovations tend to affect job quality indirectly through different mechanisms, whilst organisational innovations, especially those relating to jobs, tend to have a direct influence on job quality. It also adds a new understanding of how job quality impacts on innovation, by stating that different dimensions of job quality provide different conditions for innovation to emerge, through channels including basic support, motivation incentives, space for innovation, innovation capability, and opportunities for new ideas to be heard and developed. Moreover, it summarises three-level factors that have been found to shape innovation and job quality in China.

It is important to consider the various contextual factors, including the policy, economic, institutional, managerial and cultural characteristics in China because they constitute the special conditions that form the distinctive characteristics of innovation and job quality in China, and their relationship. Similar research in Europe confirms the difference between the conditions in China and the Europe; and different mechanisms are found in China that, nevertheless, lead to the similar outcome as in Europe: a decision for higher innovation and better jobs. Although Warhurst et al. (2018) state the possibility of both a virtuous and a vicious circle between innovation and job quality, the research in China finds positive interactions and virtuous cycle between them, mainly due to the favourable conditions in China, such as innovation being highly stressed and employees being increasingly valued.

Chapter 9. Conclusions

Innovation and job quality are two issues stressed as important by policymakers and researchers. This thesis conducted mixed-methods research to investigate innovation, job quality and their relationship in China. This chapter draws conclusions from the research. First, it summarises the purpose of this research. Second, the major findings of this research are presented. Third, based on the research findings, key points from this research are raised, adding further insights concerning these issues in the Chinese context. The contributions of the thesis are also concluded in the third section. Fourth, the strengths and limitations of this research are summarised. Finally, indications for further research and future work that have emerged from this study are provided.

9.1 Summary of the research purpose

Innovation and job quality are two important issues in the policy arena of major international organisations such as the OECD, EU and UN. In China, the government puts great emphasis on innovation, placing science and technology innovations at the centre of its innovation policies. Various relevant measures, such as financial support, talent development and innovation incubators, haven been applied by the Chinese government in order to promote innovation in China. However, job quality only vaguely features at present in China, with some policies implicitly encouraging the improvement of some aspects of job quality, such as the working conditions and employees' treatment. Also, due to its economic restructuring, China no longer wishes to compete on low labour costs. Nowadays, more high value-added output, or more innovative and knowledge-based products and services are generated in China; this potentially indicates the improvement of employee training, autonomy and earnings, the different aspects of job quality. Therefore, innovation and job quality are both important, but are not equally treated in China. Innovation has been heavily emphasised, whereas job quality has drawn little policy attention.

Some research in the literature (e.g. Muñoz-de-Bustillo et al., 2016) indicates connections between innovation and job quality but, as yet, no study has been conducted to investigate their relations in China. It is this gap in research that this research has attempted to fill, exploring the relationship between innovation and job quality in China. The main research questions are related to the "what", "how" and "why" questions, including "What is the relationship between innovation and job quality in China?", "How do innovation and job quality interact with each other?" and "Why does this situation exist in China?" There are four key objectives of this research: 1) to establish a mixed-method approach linking innovation and job quality, in order to investigate their relationship in China; 2) to explore the current state of innovation and job quality, and the interactive relationship between them in China; 3) to develop a theoretical model to help better understand the relationship between innovation and job quality in China; and 4) to provide policy recommendations for promoting innovation and job quality in China.

To achieve the research objectives, this thesis used a mixed-methods approach with both quantitative and qualitative research. This approach is chosen because the two different research methods function in achieving distinct research purposes. First, the quantitative research draws on Chinese statistical data to assess levels of innovation and job quality in different industries in China, and to help identify the following case study industries. Second, the qualitative research then examines innovation and job quality at company level, with eight case studies across four industries in the Shanghai region. The semi-structured type of interview is adopted in order to strike a balance between closed and open questions. The former ensure that answers to the same questions are received, to allow easy comparison across cases; whereas the latter help to elicit further information for in-depth understanding. In this respect, compared to the quantitative research, which aims at answering the “what” question about the levels of innovation and job quality across industries, the qualitative research mainly investigates the “how” and “why” questions, aiming to explore how innovation and job quality interact with each other, to discover why differences in innovation and job quality exist, and to explore extra data fort innovation and job quality that are missing from the statistics.

9.2 Summary of the main research findings

Drawing conclusions from across the quantitative and qualitative research, this thesis finds variations in innovation and job quality among Chinese industries and a two-directional, positive relationship between innovation and job quality in China; this indicates that a virtuous cycle can be generated, with innovation and job quality improving each other through different mechanisms and channels.

In the first analysis of its kind, the quantitative research firstly conducted a descriptive statistical analysis of the innovation and job quality at industry level in China. It found variations in both innovation and job quality among different industries in China. Regarding innovation, the industry of scientific research and technical services has the highest level of innovation among the 15 Chinese industries analysed, while the industry of wholesale and retail has the lowest level of innovation. Job quality also varies across industries. The result indicates that higher job quality tends to occur in capital-intensive industry and technology-intensive industry, such as finance, and scientific research and technical services. Lower job quality is more likely to appear in labour-intensive industry, such as construction, household services, and manufacturing. The statistical analysis then populated the Chinese industries into a four-quadrant matrix. This exercise found different configurations between innovation and job quality by industry. The matrix indicates the complex relationship between innovation and job quality across industries in China, as different combinations exist. However, due to the limitations of data availability, the relationship between innovation and job quality is difficult to capture through the statistical analysis. Nonetheless, the statistical analysis helped classify different types of industries and helped with the selection of industries for the later enterprise level case studies. As a result, four distinctive industries are chosen, namely the scientific research and technical services industry (high innovation, high job quality), the water conservancy, environment and public facilities industry (high innovation, low job quality), the finance industry (low innovation, high job quality), and the wholesale and retail industry (low innovation, low job quality).

Following the statistical analysis, the interviews within enterprise case studies also discovered variations in both innovation and job quality among industries and enterprises in China. On the one hand, different industries have distinctive features of innovation, and different types of innovations are found. The scientific research and technical services industry is characterised by a high level of technological innovation, whilst the wholesale and retail industry has limited innovation. The finance industry has diversified innovations, characterised by the adoption of new technology in financial service provision and the generation of marketing and organisational innovations. The water conservancy, environment and public facilities industry is dominated by technological innovation and organisational innovation. On the other hand, different industries also have distinctive features of job quality. There is a noticeable contrast between the industry of scientific research and technical services and that of wholesale and retail, as the former has a very high level of job quality, whereas the latter has very low job quality overall. The water conservancy, environment and public facilities industry commonly has a potential safety problem, because of risky constructions and the chemicals involved. In the finance industry, the overall job quality is high, but the private financial enterprise has problems of overtime work and an imbalance between work and life. Moreover, and significantly, there are distinctions between job quality in the state-owned enterprises and private enterprises among the different industries interviewed, as the former is relatively higher than the latter. While state-owned enterprises are characterised by stable, secure, fixed and well-paid jobs with autonomy and social dialogue ensured through formal approaches, the jobs in private enterprises often have problems such as insecurity, overtime work and unbalanced work-and-life, due to less formal arrangements being adopted in the enterprises, and pressures from the market and competitors.

In terms of the relationship between innovation and job quality, it is concluded that they mutually affect each other in enterprise level environments where innovation is encouraged. The condition of an innovation-encouraging environment is essential because employees can be motivated to innovate if they are encouraged to do so. The findings reveal three key points regarding the overall relationship between innovation and job quality: 1) there is a two-directional relationship between innovation and job quality, as innovation impacts on job quality and job quality impacts on innovation; 2) there is a positive relationship between innovation and job quality, as higher innovation leads to better job quality and better job quality results in higher innovation; and 3) there is both a direct and indirect relationship between innovation and job quality, as they can influence each other either directly or indirectly. This thesis indicates that a virtuous cycle between innovation and job quality can be generated, with both improving each other through different mechanisms and channels. On the one hand, higher innovation can lead to better job quality either directly or indirectly. Different innovations can impact on job quality directly, resulting in changes in different job quality aspects: for instance, the adoption of new products, processes, marketing methods or organisational practices triggers learning and training; the application of safer chemicals and machines at work ensures higher job safety; and workplace innovations that change any aspects of job quality, such as the wage system and work schedule, affect job quality directly. Innovations can also influence job quality indirectly through various mechanisms such as improved performance, profit, productivity and efficiency. On the other hand, higher job quality can in turn promote innovation through different channels because different dimensions of job quality play different roles and provide different conditions for future innovation. For example, the dimension of earnings and benefits from job, and the dimension of safety, security and equality, provide basic support for innovation. Moreover, earnings and benefits from job is also an important motivation incentive for employees to innovate. The working hours and work-life balance dimension offers essential space for innovation. While the skills and development dimension enables employees to build capability for innovation, the autonomy and social dialogue dimension provides opportunities for new ideas to be heard and developed. There is a consensus among the participants within the case studies that a job with a secured contract, good pay and less pressure (e.g. a loose work schedule providing space for devising innovative ideas) is favourable for innovation.

9.3 Key points and contributions of the research

Through analysis of the research findings and comparison with relevant studies in the literature, several key points are developed from this thesis, providing further insights regarding the important issues and special characteristics that need to be noted in the Chinese context. The following paragraphs summarise the key points raised in this thesis as well as the major contributions of this research.

First, according to the empirical research conducted in this thesis, China is currently dominated by technological innovation or the STI (science, technology and innovation) mode of innovation, as both qualitative and quantitative research shows that technological innovations are being achieved in various industries and enterprises in China. This finding is consistent with the Chinese innovation policies which focus on science and technology innovations (e.g. State Council, 2013). There are statistics about technological innovations in China, but limited data for non-technological innovations, including marketing innovation and organisational innovation. The qualitative research of this thesis addresses this data limitation and complements the statistical analysis, by gathering more information in terms of both width and depth. However, the case study interviews explored data that are missing in statistics and found that organisational innovation and marketing innovation commonly exist in the different enterprises and industries investigated. Therefore, this thesis indicates that non-technological innovations also take place in Chinese enterprises and organisations, but they are overlooked. A case in point is the finance industry being marked as low innovation in the statistical analysis, which only investigated technological innovations, due to limited data availability in China. However, data from interviews within the finance industry discovered dynamic innovations in terms of marketing and organisation.

Thus, the overall level of innovation in the finance industry is found to be higher when taking all types of innovations into account. In addition, the analysis of the Chinese innovation system indicates that government and market powers coexist and vary across sectors and industries in driving innovation in China, with both strengths and weaknesses of such system. For example, there are strengths in government's direction and financial support for technological innovation, vocational training and human capital formation, and high efficiency in implementing what the government wants, but risks in lacking checks and balances of the system, marginalising other sectors in society, and cultural problem which discourages innovation

Second, regarding job quality, wage structures, employees' autonomy and skills are improving in Chinese enterprises, although there are common features of overtime-working, casualisation and government control over industrial relations in all sectors, which challenge the effectiveness of relevant legislation and policies reviewed in literature. There are also noticeable differences between state-owned and private enterprises in China. The overall job quality in state-owned enterprises is higher than that in private enterprises in the same industry. While job quality in state-owned enterprises retains some traditional characteristics of jobs in the old system (i.e. secure, stable, fixed and well-paid jobs), jobs in private enterprises are less stable, secure or fixed, and are more competitive because they are more directly affected by the market economy. Problems of overtime-working, imbalance between work and life, and high employee turnover are worse in the private enterprises. Compared with the jobs in state-owned enterprises, interviewees from the private enterprises in China indicate higher pressures from work, and their autonomy and social dialogue tend to be achieved through informal means. Nevertheless, as Sheldon et al. (2011) mention, given the new standard of ideal career development that values the opportunities for self-development and enhancement, in addition to the traditional focus on pay rises and promotion, some employees might prioritise the pursuit of their career above staying with the organisation. Therefore, despite the higher overall job quality in state-owned enterprises in China, not all employees prefer to work in state-owned enterprises rather than private enterprises. In the free labour market, employees choose their jobs according to individual evaluations and preferences.

Third, this thesis finds consistent evidence for a two-directional positive relationship between innovation and job quality in China. Although some industries and enterprises have higher levels of innovation or job quality than others, it is common that innovation improves job quality and job quality promotes innovation, with different types of innovation and different dimensions of job quality involved. Therefore, given the different levels of innovation and job quality observed in Chinese industries and enterprises, why is there a consistent positive relationship between the two? Through discussion, the Chinese policy orientations and the changing model of China constitute a favourable context for the positive relationship between innovation and job quality in China. On the one hand, policies stress innovation in China, coupled with various measures such as favourable tax rates and subsidies for high-tech enterprises that encourage innovation. On the other hand, China’s new model values employees more than in the past. The focus has changed from personnel management to human resource management, which emphasises employee development and better treatment for employees; this is an indication of improving job quality. Also, the contextual factor of value chain restructuring, from cost-based to quality-based economy in China, requires higher innovation and job quality. Therefore, in such a background that encourages both innovation and job quality, a positive relationship between the two is found in China. Indeed, innovation and job quality can work together and promote each other. This finding is important because it not only adds new knowledge to the relationship between innovation and job quality in China, but it also indicates the potential to establish effective policies that can lever innovation and job quality in China, as both are important in China. Compared with similar research in other countries, mainly the QuInnE project in Europe, which also finds a virtuous circle between innovation and job quality, the conditions in China and Europe are different (e.g. Jaehrling et al., 2018). However, the different conditions, which cause distinctive mechanisms, finally result in a similar outcome in both China and Europe, i.e. a decision to promote higher innovation and better jobs. As such, this thesis lends empirical weight to the QuInnE findings, suggesting that this two-directional positive relationship exists beyond Europe.

Fourth, given that both the quantitative and qualitative research shows the variations in innovation and job quality in China across industries, this thesis frames three-level factors, indicating that the variations in innovation and job quality in China are shaped by various factors at macro, meso and micro levels. Existing literature stresses certain factors respectively but they are not sufficient (e.g. Nelson and Winter, 1982; Pavitt, 1984; Carré and Tilly, 2012; Frenkel, 2015; Murray and Stewart, 2015). This thesis provides a more comprehensive framework for analysing innovation and job quality in China. The macro-level factors refer to national institutions (e.g. policies, laws, regulations, standards) and political regimes and economic features (e.g. socialist market economy, economic structure and performance). The meso-level factors mainly include the industrial nature and institutions (e.g. norms, common habits, established practices, rules and standards), market characteristics (e.g. market structure, product market, labour market, competition) and networks (e.g. communication, exchange, control and cooperation among various organisations). The micro-level factors involve actors (e.g. various organisations and individual participants involved, their strategies and decisions), knowledge base and technological domain, innovation sources and activities, and work organisation (e.g. the governance, management and involvement of employees and work). The three-level factors impact on innovation and on job quality, resulting in national, industrial and enterprise-level differences in innovation and job quality. The combinations of innovation and job quality further lead to the distinctive configurations between innovation and job quality, as discovered in both the quantitative and qualitative research in China, and which are related to the multi-level factors identified above. Through analysis, the meso- and micro-level factors are intrinsic to the variation of innovation and job quality, because different industries and enterprises have distinctive characteristics and conditions. Macro-level factors are extrinsic and shape innovation and job quality across countries, industries and enterprises.

Finally, in order to promote innovation and job quality in China, this research finds that having an innovation-encouraging environment or a culture of innovation within the organisation is an important prerequisite, because it is difficult to motivate employees to innovate if they are not expected to do so. This explains why the wholesale and retail industry enterprises included in this study have limited innovation and a relatively weak relationship between innovation and job quality. This prerequisite is also important for organisations hoping to improve innovation and job quality by applying internal measures. According to this study, interview participants commonly prefer jobs with a secure contract, good pay and no pressure; they state that it helps them achieve innovation more easily than a position with unemployment risks, unsatisfactory earnings and excessive pressure. This is because secure tenure, good pay and less pressure provide favourable conditions for employees, and enable them to focus on their work and to generate innovations. Furthermore, a harmonious work environment and a culture of sharing and cooperation, as well as recognition and respect from others within the organisation, help improve innovation and job quality in China.

For enterprises wanting to promote innovation and job quality through a virtuous cycle, the study suggests that internal strategies and policies that provide beneficial mechanisms linking innovation with job quality can be introduced. Based on participants' answers from the interviews, three suggestions are given, which have proven to be effective in China. First, an internal reward system for innovation can be established, in order to motivate employees to innovate, and to improve job quality through the dimension of earnings and benefits from work. Second, enterprises can link innovation to employees' performance, as another incentive policy for higher innovation which can also improve job quality through performance-related benefits. Third, it is necessary to generate a culture of innovation within the enterprise that encourages cooperation among colleagues, and thus creates more innovation and better conditions at work. These three suggestions provide stimulating mechanisms that help enterprises to promote both innovation and job quality by linking them together.

To draw conclusions on the contributions of this thesis, it is the first attempt to investigate the relationship between innovation and job quality in China, and contributes to current understanding mainly in four ways: first, an empirical contribution, being the first study of the topic in China; second, a methodological contribution in using a mixed-methods approach linking innovation and job quality to study their relationship in China; third, a theoretical contribution to the understanding of the relationship between innovation and job quality in China; and fourth, a practical contribution with policy recommendations for promoting innovation and job quality in

China. The following paragraphs further explain these contributions.

The empirical contribution lies in this research being the first empirical study to explore the relationship between innovation and job quality in China. It investigates different Chinese industries and enterprises in terms of innovation, job quality and their relationship. It identifies levels of innovation and job quality at industry level in China statistically, which no prior study has done. It also indicates the configurations between innovation and job quality, thus providing a new typology for Chinese industries as no previous research has related innovation with job quality to differentiate Chinese industries.

The methodological contribution of this research is the use of a mixed methods approach that links innovation and job quality in order to study their relationship in China. This research establishes an analytical framework that includes innovation and job quality indicator models for measuring innovation and job quality in China. Different research methods, namely statistical analysis and interviews within case studies, have been designed specifically to explore this topic in China, in order to achieve distinctive goals effectively, while taking account of the current data availability problem in China. No previous research has been done using mixed methods approach to explore the relationship between innovation and job quality in China and it enabled other forms of innovation to be explored plus the dynamics of relationship between innovation and job quality within enterprises. Although QuInnE adopted mixed methods to investigate relevant research in Europe, the specific research design in this thesis is different from that in Europe, as different innovation and job quality indicators are established in order to better fit the study in China.

The theoretical contribution of this research involves improving the understanding of the relationship between innovation and job quality in China. Previous research focused on certain aspects of innovation and job quality and was in different countries (e.g. Bysted, 2013; Dailey et al., 2015; Okoe et al., 2017). This research advances existing knowledge by achieving the holistic understanding of the topic. It explores the causal relationships between innovation and job quality and provides more detail on the various direct and indirect mechanisms by which innovation and job quality are related in the Chinese context. It also draws distinctions among different innovations and job quality aspects in the relationship between the two. The exploratory models generated in this research, including the four-quadrant matrix of industry typology, the two-directional relationship model of innovation and job quality, as well as the three-level factors model, can be used as the bases for more substantive empirical investigations on the relationship between innovation and job quality in the future.

The practical contribution of this research lies in its significance to relevant policymaking in China, as it provides comprehensive information on innovation and job quality in China. Recommendations on improving innovation and job quality in China are given. For example, it suggests that more attention be paid to non-technological innovation and job quality in China. It also offers effective mechanisms, strategies and policies at company level for promoting innovation and job quality in China.

9.4 Strengths and limitations of the research

Following the key points and contributions presented in the previous section, this section concludes the strengths and limitations of this research.

This research has several strengths. Firstly, it is the first empirical study of the relationship between innovation and job quality in China. The study is more comprehensive because it includes different types of innovation, various indicators of job quality, and investigates the complex interactions between them. For instance, both technological innovations, including product and process innovations, and non-technological innovations, including marketing and organisational innovations, are considered. Moreover, different dimensions of job quality, such as earnings, working hours, safety, skills and autonomy, are explored. The complex interactions, including innovation's impact on job quality and job quality's impact on innovation, as well as the various mechanisms between them, are demonstrated. In comparison, prior research has only studied certain types of innovation and limited job or work-related aspects, and is thus relatively segmented. A few studies have investigated the whole topic, but they focus on the European context, e.g. the QuInnE project (see Muñoz-de-Bustillo et al., 2017; Jaehrling et al., 2018; Warhurst et al., 2018). Although others of theses studies have focused on service innovation, psychological aspects of job quality and workplace practices (e.g. Yuan and Woodman, 2010; Bysted, 2013; García-Buades et al., 2016; Okoe et al., 2017), no previous study has been conducted that systematically explores the relationship between innovation and job quality in China. Furthermore, this research analyses not only secondary data from the government's statistics, but also primary data collected from the interviews conducted by the author, thereby using a combination of different data sources and deriving a joint conclusion from them. It has strength in having both detailed enterprise information and aggregated industrial statistics that allow for analysis at different levels, thus acquiring more insight.

Secondly, it is the first research to use a mixed-methods approach, linking innovation and job quality to study their relationship in China. Other studies commonly employed only quantitative approach (e.g. Chen, 2017; Jensen et al., 2017; Shin et al., 2017). The mixed-methods approach adopted in this thesis provides the flexibility to conduct more comprehensive studies, as noted by Hesse-Biber (2016); it addresses complex analytical and interpretive issues that arise when bringing diverse ways of thinking and different data to bear in seeking answers to multifaceted questions. The strengths of using a mixed-methods approach are that it not only enables different research methods to complement each other in achieving distinct research aims, but also ensures that the results are valid through triangulation. To be specific, the quantitative research conducted first identifies the levels of innovation and job quality across industries in China and the different configurations between them, and a process of narrowing down helps to identify the industries to be interviewed in subsequent case studies. The qualitative research that followed exploring how innovation and job quality interact with each other and why this situation exists, could not be achieved through the quantitative research. The qualitative interviews complement the quantitative analysis, for which, as has already been noted, statistical data are limited in China. The interview data enables inclusion and exploration of what is not included in the official statistical data, such as non-technological innovations and further job quality aspects as well as the gathering of in-depth data relating to the understanding of the relationship between innovation and job quality in China. The findings from the different research methods are consistent, indicating that the results are valid. For instance, both the statistical analysis and interview analysis show that technological innovations are dominant in China. The levels of innovation and job quality in each industry are consistent in the different research types. Moreover, this research has strengths in its research design, in terms of access, industries and types of enterprises investigated. Access to large and medium-sized enterprises in China is difficult to obtain, especially in the case of state-owned ones. Nevertheless, this research achieved such access, and interviewed respondents at eight large and medium-sized enterprises in China, including four state-owned enterprises and four private enterprises. Different industries are investigated in both the quantitative and qualitative research, providing comparative findings across industries in China. In addition, the research studies and compares different types of enterprises, i.e. state-owned enterprises and private enterprises, drawing specific conclusions in each case.

Thirdly, this research adds new knowledge to the understanding of the topic in China by establishing theoretical models for the relationship between innovation and job quality in China. Based on the empirical findings of this research, the thesis creates original models indicating the two-directional positive relationship between innovation and job quality in China. The thesis not only provides a model showing the overall relationship between innovation and job quality, but also offers a detailed exploration of how innovation and job quality influence each other through different mechanisms and channels respectively. For example, innovation impacts on job quality either directly or indirectly, through mechanisms such as improved performance, profit and productivity. Job quality impacts on innovation through various channels: for instance, earnings, safety and security provide basic supports for innovation; skills and development increase innovation capability; and autonomy and social dialogue offer opportunities for new ideas to be heard and developed. Thus, the theoretical models generated in this research improve the understanding of the relationship between innovation and job quality in China. The theoretical finding in this thesis supports similar findings to those of Muñoz-de-Bustillo et al. (2017) in that both research indicates a two-directional positive relationship between innovation and job quality with different mechanisms. However, this study extends understanding further as both direct and indirect impacts are considered, more mechanisms of job quality's impact on innovation are explored and various impacts by types of innovation are identified – a possibility denied to Muñoz-de-Bustillo et al. because of limitations to the European data.

Fourthly, this research not only investigates the topic in China, but also provides suggestions mainly for enterprise-level policy and strategy in the Chinese context. The suggestions and policy recommendations are developed based on the analysis of participants' responses in the interviews, and have been proved to work effectively in the Chinese organisations. Chinese enterprises aiming to promote innovation and job quality can adopt the suggestions given in this research, as it provides beneficial mechanisms that link innovation and job quality together, and helps enterprises to effectively achieve both improved innovation and job quality. The suggestions and recommendations from this research are also unprecedented in China, as no prior research has studied the topic, nor have any prior policy recommendations been made to promote both innovation and job quality in China. Moreover, the suggestions from this research have strengths and significance, due to the fact that both innovation and job quality have attracted policy attention in China, as discussed earlier.

The research does, however, have some limitations. First, the main part of this research, namely the interviews, were conducted in the Shanghai region, which helps to control for the disturbing influences from regional variables when making comparisons between industries and enterprises. This means that when making industrial or enterprise-level analysis, the differences discovered result from the industry or enterprise itself and are not biased by regional factors. However, little is known about the relationship between innovation and job quality in other regions of China. Hence, if the research were conducted in other regions, it is unclear whether the results would be similar or different to the findings from this research. Therefore, despite the great impact of Shanghai's economy and its prominent role in China, it is still necessary to repeat the research in other regions of China and conduct further studies to investigate the topic. Second, though the statistical analysis investigates various industries, the case studies interview four industries in China. Although the four industries selected represent four distinct types of industries identified, with different levels of innovation and job quality, it would be better to explore more industries and gain more data, in order to verify the conclusions of the research. In having eight enterprises in four industries in China, this research achieves diversity among the cases investigated. However, with only 16 respondents across these cases, generalisations are difficult. Future research would benefit from having a greater number of respondents. Moreover, future research might include a wider range of workers. This study focused on workers who are directly and formally employed by their organisations. Temporary workers, who are common in China, were not included. Research suggests a dualistic labour regime in China in which the conditions of temporary workers are different from those of formal workers (e.g. Lin, 2015; Jia, 2016). Third, it should be noted that the topic is complex, given the problematic nature of indicators, weaknesses of formal statistics and variations in contexts. However, this research manages to establish innovation and job quality indicators being comprehensive yet manageable to explore their relationship based on the data availability in China.

In summary, this research has strengths mainly in terms of the comprehensive empirical study conducted; the research design, using a mixed-methods approach to achieve distinct purposes, and good access that allows a comparison across industries and enterprises; the theoretical models developed for understanding the relationship between innovation and job quality in China; and the practical suggestions for promoting innovation and job quality in China. With regard to the limitations, the research can be further improved if more regions, industries and respondents are investigated in China.

9.5 Further research and future work

The first of its kind, this study is groundbreaking. However, as an exploratory study, further research is needed. There is literature showing regional differences in China in terms of business system, innovation and job quality, which has been mentioned in the thesis. For instance, it was noted that different regions in China present distinctive development models of local business systems (see Zhang and Peck, 2016). The uneven institutional evolution across sub-national regions was reported to have profound impact on academic collaborations and firms' innovativeness (Kafouros et al., 2015). There are different regional innovation policies (Sheng and Sun, 2013) and regional innovation collaborative systems located in separate areas such as the Yangtze River Delta, Pearl River Delta and Beijing-Tianjin-Hebei (State Council, 2013). There are also varying regulations and standards for job quality aspects, such as minimum wage (Askci.com, 2015), across provinces and cities. This thesis focuses on the Shanghai region, and interviews respondents from four industries. Given that there appears to be sub-national innovation systems in China based on regionality, it would be useful for further research to be conducted in other regions of China, focusing on those regions' key industries. Such research would explore the relationship between innovation and job quality and help test the findings of this thesis. Further discussion and analysis can then be made by comparing this research with such further research.

Moreover, this research indicates that non-technological innovations, including marketing innovation and organisational innovation, are underestimated in China, as current policies stress science and technology innovations. This research finds dynamic non-technological innovations to be present in different industries and enterprises in China. Although China focuses on technological innovation, other research from Europe (e.g. Lundvall, 1992) suggests that other forms of innovation might be at least as effective. Going forward, China might look to explore this other form of innovation. Research by QuInnE indicates that there is a cognitive gap between innovation policy and innovation research, and measurement tools are partial or inappropriate to evaluate and to give feedback to innovation policies (Makó and Illéssy, 2018). The findings of this study suggest a need for applying the broad-based innovation approach in the policy formation in China, and renewed measurement tools including new indicators to embrace innovation in a more complex way. Therefore, this research suggests that policy attention be paid to non-technological innovations, and that further research on non-technological innovations be conducted in China. Besides, as national data only present formal employment but this research shows that casualisation is common in China, it suggests further research on informal employment and temporary workers, which have not been explored in this research.

Furthermore, due to the limited data for innovation and job quality in China, it is unfortunately impossible to conduct in-depth statistical analysis to investigate the relations quantitatively. For example, the data does not enable multivariate analysis and correlation analysis to be conducted in order to explore causality. As a result, this research conducts descriptive statistical analysis and mainly gathers qualitative data to explore the relationship between innovation and job quality in China. In comparison, the QuInnE project in Europe conducted a more sophisticated quantitative analysis based on data from the European Working Conditions Survey and the European Company Survey provided by the European Commissions (Muñoz-de-Bustillo et al., 2016 & 2017). While recognising that there are still limitations to some of this European data, particularly with respect to innovation (Makó and Illéssy, 2018), it would be helpful for future analysis in China if similar data was available. Thus, it is suggested that with the improvement of relevant databases in China, especially in terms of non-technological innovation and job quality data, further research can be performed to further explore the relations between innovation and job quality, and test the findings quantitatively. With better quantitative data available, it helps to effectively test hypotheses on innovation and job quality, and provides complementary source for the exploration of the topic which cannot be achieved in qualitative ways. For example, it can benefits research with large population sample and results for greater generalisation.

In addition, as this research focuses on enterprise-level analysis, more research can be conducted at the macro level, to investigate how innovation and job quality impact on each other and affect the economy and labour at a more aggregated level in China. Therefore, while this research provides useful suggestions regarding company-level strategies and policies in China, future work on the national policy side could be developed, to enable policy makers to reinforce innovation and job quality at more aggregated levels. Also, further research beyond the enterprise level could provide beneficial suggestions specialised for organisations in different fields, such as industrial associations, trade unions, and economic development districts.

Finally, to present conclusions on the policy implications from this research, three main points can be made. First, this research provides theoretical models that explore the complex interactions between innovation and job quality in China; these help policy makers to better understand the relationship between the two, and to establish relevant policies promoting both innovation and job quality in China. Second, this research analyses and presents the multilevel factors that shape the variations in innovation and job quality discovered in China, and provides an important summary of the influential factors which can be applied to policy measures to achieve distinct objectives of innovation and job quality in different industries and enterprises. Third, the effective mechanisms and strategies provided by this research offer practical policy recommendations for improving innovation and job quality at enterprise level in China.

To summarise, this research has investigated the relationship between innovation and job quality in different industries and enterprises in China. It has provided new empirical data and broken ground methodologically. It has also made a theoretical contribution to understanding the nature of the relationship in the Chinese context, particularly at the level of the enterprise. Its findings need to be tested through other, future studies but the study has provided an important first step in improving understanding of both innovation and job quality and the relationship between innovation and job quality in China.

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Appendices

Appendix 1. Innovation indicators in Innovation Union Scoreboard 2015

Enablers
Human resources
1.1.1 New doctorate graduates
1.1.2 Population completed tertiary education
1.1.3 Youth with upper secondary level education
Open, excellent and attractive research systems
1.2.1 International scientific co-publications
1.2.2 Scientific publications among to 10% most cited
1.2.3 Non-EU doctorate students
Finance and support
1.3.1 R&D expenditure in the public sector
1.3.2 Venture capital investments
Firm activities
Firm investments
2.1.1 R&D expenditure in the business sector
2.1.2 Non-R&D innovation expenditure
Linkages & entrepreneurship
2.2.1 SMEs innovating in-house
2.2.2 Innovative SMEs collaborating with others
2.2.3 Public-private co-publications
Intellectual assets
2.3.1 PCT patent applications
2.3.2 PCT patent applications in societal challenges
2.3.3 Community trademarks
2.3.4 Community design
Outputs
Innovators
3.1.1 SMEs introducing product or process innovations
3.1.2 SMEs introducing marketing/organisational innovations
3.1.3 Employment fast-growing firms innovative sectors
Economic effects
3.2.1 Employment in knowledge-intensive activities
3.2.2 Medium & high-tech product exports
3.2.3 Knowledge-intensive services exports
3.2.4 Sales of new to market and new to firm innovations
3.2.5 License and patent revenues from abroad

Source: Innovation Union Scoreboard 2015.

Appendix 2. Innovation indicators in China's National Innovation Capability Survey

1st class indicator	2nd class indicator
Innovation resources	1. R&D expenditure input intensity
	2. R&D human resource input intensity
	3. Scientific human resource training level
	4. Information development level
	5. Ratio between R&D expenditure and that of the world
Knowledge creation	1. Number of citations of scientific paper funded by over one million R&D expenditure
	2. Number of scientific papers among ten thousand scientific researchers
	3. Number of internet users among one hundred people
	4. Number of patent applications among one hundred million USD economic output
	5. Number of patent authorisations among ten thousand researchers
	6. Ratio between number of scientific papers and that of the world
	7． Ratio between number of trilateral patents and that of the world
Enterprise innovation	1. Ratio between enterprise R&D expenditure and industrial added value
	2. Number of PCT patents among ten thousand enterprise researchers
	3. Autonomy rate of comprehensive technology
	4. Ratio between new product revenue and enterprise' main business revenue
	5. Ratio between high-tech industrial added value and whole manufacturing
Innovation performance	1. Labour productivity
	2. Economic output of per unit energy consumed
	3. Life expectancy
	4. Ratio between high-tech industrial exports and manufacturing exports
	5. Ratio between knowledge services added value and GDP
	6. Ratio between knowledge-intensive industrial added value and that of the world
Innovation environment	1. Protection of IPR
	2. Governmental regulation impact on enterprise's burden
	3. Macroeconomic environment
	4. Professional research and training service

	5. Effectiveness of antitrust policy
	6. Relation between employee's income and performance
	7. Difficulty level of enterprise innovation project receiving venture capital support
	8. Development of industrial cluster
	9. Coordination level between enterprise and university
	10.Impact of government procurement on technological innovation

Source: National Innovation Capability Assessment System, 2013.

Appendix 3. Innovation indicators in China's Regional Innovation Capability Survey

1st class indicator	2nd class indicator
Innovation environment	1. Population having higher than college degree among ten thousand people
	2. Ratio between enterprise R&D expenditure deducted in tax and that of whole country
	3. Ratio between fixed asset investments in Information transmission, computer services and software and total fixed asset investments
	4. Number of landline and mobile phone users among one hundred people
	5. Number of internet users among ten thousand people
	6. Number of trademark among one million people
	7. Regional per capita GDP
Innovation resources	1. Ratio between R&D expenditure and regional GDP
	2. Ratio between financial education expenditure and regional GDP
	3. Ratio between local financial expenditure on S&T and local financial expenditure
	4. Ratio between local financial expenditure on S&T and regional GDP
	5. Ratio between national innovation funds and R&D expenditure
	6. Ratio between funds of national industrialization project and R&D expenditure
	7. Ratio between enterprise financial institution loan and enterprise R&D expenditure
	8. Number of R&D personnel among ten thousand people
	9. Ratio between tax deduction in high-tech enterprise and that in whole country
	10. Ratio between newly-added fixed assets in scientific research and comprehensive technical services and newly-added fixed assets in whole society
	11. Number of national papers among ten thousand people
	12. Number of international papers among ten thousand people
Enterprise innovation	1. Ratio between enterprise R&D expenditure and R&D expenditure
	2. Ratio between enterprise R&D expenditure and main business revenue
	3. Ratio between enterprise technology acquisition and reform expenditure and enterprise main business revenue
	4. Ratio between enterprise trust fund investment and research institution and university R&D expenditure
	5. Ratio between enterprise scientific research expenditure

	and enterprise R&D expenditure
	6. Ratio between R&D expenditure from enterprise and R&D expenditure of university and scientific research institution
	7. Enterprise average trading volume of technology
	8. Ratio between enterprise R&D personnel and people employed
	9. Ratio between enterprise having R&D institution and total enterprises
	10. Number of patents among ten thousand enterprise employees
Innovation outputs	1. Number of patent applications among ten thousand people
	2. Number of patent applications funded by one hundred million CNY R&D expenditure
	3. Number of patent authorisation among ten thousand people
	4. Number of patent authorisation funded by one hundred million CNY R&D expenditure
	5. Number of patents among ten thousand people
	6. Technical contract turnover among ten thousand people
	7. Ration between authorisation of new agricultural plants and added value of agriculture
	8. Technology international revenue among one million people
	9. Ratio between added value in high-tech industry and GDP
	10. Ratio between sales revenue of new products and main business revenue
Innovation effects	1. Ration between commodity exports and regional GDP
	2. Ratio between exports of high-tech products and commodity exports
	3. Ratio between added value in tertiary industry and regional GDP
	4. Ratio between high-tech enterprise and industrial enterprise
	5. Ratio between employees in high-tech industry and those of whole society
	6. Labour productivity
	7. Capital productivity
	8. Comprehensive energy consumption rate
	9. Proportion of days with air quality above level 2
	10. The percentage of meeting oxygen requirement minimum in industry waste water
	11. The percentage of meeting sulfer dioxide emission limits
	12. The water saving rate of extra industry usage per unit
	13. The percentage of meeting Amonia and Nitrogen concentration limits

	14. Particulate wastes integral processed rate

Source: Regional Innovation Capability Assessment System, 2013.

Appendix 4. Innovation indicators in China's Enterprise Innovation Capability Survey

1st class indicator	2nd class indicator	3rd class indicator
Innovation inputs	1. Innovation expenditures	（1）Ratio between innovation expenditure and main business revenue
		（2）Ratio between R&D expenditures and main business revenue
	2. Innovation human resources	（1）Ratio between R&D personnel and employed population
		（2）Ratio between doctorate graduates and employed population
	3. Research institutes	（1）Ratio between research institute's R&D expenditure and enterprise's R&D expenditure
		（2）Ratio between research institute's R&D personnel and enterprise R&D personnel
Synergy innovation	4. Industry-university-Research cooperation	（1）Ratio between enterprises participating in industry-university-research cooperation and total enterprises
		（2）Ratio between R&D expenditure on university and research institutes and enterprise's external R&D expenditure
	5. Innovation resource integration	（1）Ratio between technology import expenditure and R&D expenditure
		（2）Ratio between technology digestion and absorption expenditure and technology import expenditure
	6. Collaborative innovation	（1）Ratio between enterprise collaborating innovation and total enterprises
		（2）Ratio between collaborative patent applications and total patent applications
Intellectual property rights	7. IPR creation	（1）Ratio between enterprise patent applications and total patent applications
		（2）Number of patent applications funded by 100 thousand CNY (16 thousand USD equivalent) R&D spending
	8.IPR protection	（1）Ratio between enterprises having patent and total enterprises
		（2）Number of patents in 10 thousand employed population
	9. IPR utilisation	（1）Ratio between patents implemented and total patents
		（2）Ratio between revenues of patent licensing and transfer and sales revenues of new products
Innovation incentives	10. Innovation value realisation	（1）Ratio between marketing expenditure on new products and total marketing expenditure
		（2）Ratio between sales revenues of new

		production and main business revenues
	11. Market influence	（1）Ratio between PCT applications and patent applications
		（2）Ratio between enterprises with independent brands and total enterprises
	12. Economic and social development	（1）Labour productivity
		（2）Comprehensive energy consumption rate

Source: Enterprise Innovation Capability Assessment System, 2013.

Appendix 5: Dimensions, policy objectives and main instruments of QWE in EU EES

Dimensions	Key policy objectives and standards	Main instruments
1. Intrinsic job quality	Jobs ought to be intrinsically satisfying, compatible with a person's skills and abilities, and provide appropriate levels of income.	EU and MS economic and social policies in general, Broad Economic Policy Guidelines, European Employment Strategy, Social Partners
2. Skills, lifelong learning, and career development	People ought to be able to develop their potential abilities to the full through appropriate support for lifelong learning.	Education and lifelong learning policies, legal framework, including mutual recognition of qualifications
3. Gender equality	Labour markets should offer equal opportunity for men and women in respect of equivalent value jobs, and in terms of lifetime careers.	European Employment Strategy, legislation, social partners, action programmes
4. Health and safety at work	It has to be ensured that working conditions are safe, healthy and supportive - in both physical and psychological terms - of sustainable participation and employment.	New health and safety strategy, including legislation backed by monitoring and benchmarking, social partners
5. Flexibility and security	An appropriate balance between flexibility and security is called for to encourage positive attitudes to change at the workplace and in the labour market. This requires appropriate support for those who lose their jobs or are seeking an alternative, as well as encouragement for the full use of abilities and flexible career choices through appropriate support for occupational and geographical mobility.	Open method of coordination, taxation, legislation, social partners, transferability of supplementary pension rights, information and agency support
6. Inclusion and access to the labour market	Access to and inclusion in labour markets should be increased, including for those entering the labour market for the first time or after a period of unemployment or inactivity, and allow them to stay in	European Employment Strategy, Public employment services at EU level, European Social Fund, Corporate social responsibility, work on

	the labour market.	local development
7. Work organisation and work-life balance	Working arrangements, especially those concerning working time, together with support services should allow an appropriate balance between working life and life outside work.	European Employment Strategy, legislation, social partners
8. Social dialogue and worker involvement	All workers should be informed about and involved in the development of their companies and their working life.	Social partners cooperation, legislation
9. Diversity and non-discrimination	All workers should be treated equally without discrimination in terms of age, disability, ethnic origin, religion or secual orientation.	European Employment Strategy, social partners, action programmes, European Social Fund (EQUAL)
10. Overall work performance	High levels of labour productivity and high living standards across all regions of the Community	Economic policies and structural policies

Source: European Commission, 2001; Peña-Casas, 2009: 13.

Appendix 6. Interview schedule

Innovation and job quality interview schedule

Name:
Location:
Interviewer:
Date:

1. Could you introduce your company please?

2. What's your job and position in the company?

Innovation's impact on job quality

3. How is the innovation in your company?

4. Does innovation in your company impact the job quality of employees?

- If yes, is it a positive impact or negative impact?

How does it affect job quality?

Why do you think it can have such influences?

- If no, why there is no change of job quality when innovation occurs in your company?

5. What aspects of job quality does innovation impact in your company? Are they: earnings and benefits from job; working hours and work-life balance; safety, security and equality; skills and development; or autonomy and social dialogue? Please give examples.

6. Why does innovation have such impact on job quality? Among the various factors affecting the quality of job, which aspects of change resulted from innovation do you think have more impact on job quality? For example, the growth of productivity, the work condition and environment, the structural changes of economy, and other aspects of innovation if any. Please specify and explain it.

Job quality's impact on innovation

7. How is the job quality in your company?

8. Does the quality of job impact the innovation in your company?

- If yes, does good job quality lead to innovation or bad job quality lead to innovation?

How does the level of job quality affect innovation?

Why there are such influences?

- If no, why it makes no difference to innovation between different levels of job quality?

9. What aspects of innovation are more likely to be affected by job quality in your company? Please give examples.

10. Among the five dimensions of job quality listed below, which one do you think plays an important role in promoting innovation?

- Earnings and benefits from job: including wage and non-wage pecuniary benefits;

- Working hours and work-life balance: including working hours, working time arrangements, and balancing work and non-working life;

- Safety, security and equality: including safety of work, security of work (access and social protection), and fair treatment;

- Skills and development: including training and qualification for work;

- Autonomy and social dialogue: including rights to organise and bargain collectively.

Please give reasons and explain how they promote innovation.

Policy implications

11. Does your company have any policy on promoting innovation?

- If yes, what are they? Are they effective? Why they are effective or not effective?

- If no, you probably don't value innovation, why?

12. Does your company have any policy to improve job quality?

- If yes, what are they? Are they helpful? Why?

- If no, why there is no policy to improve job quality in your company?

13. According to your experience, do you have any suggestions on promoting innovation and job quality?

14. Is there anything else you wish to add?

Appendix 7. Respondent information sheet

Exploring the relationship between innovation and job quality: evidence from China

We would like to invite you to take part in our research study about the relationship between innovation and job quality in China. It is a PhD research project based on the University of Warwick. Before you decide, we would like to introduce you about this research and what will involve in the interview.

This research aims at reaching a better understanding of the relationship between innovation and job quality in China, by considering key questions of “What is the relationship between innovation and job quality in China? Why does such relationship exist? And how do they affect each other?”. The interview will ask questions about different aspects of innovation and job quality, and their impact. This research will finally give suggestions of best practices for levering high innovation and high job quality in Chinese enterprises.

If you are willing to participate, it will involve:
· Being interviewed for approximately 30 to 45 minutes at a time that is convenient to you;
· having your interview recorded and protected safely if agreed, otherwise notes will be taken during the interview;
· having the right to ensure anonymity when quoted;
· having the opportunity to view and comment on the transcript of the interview before it is completed.

You may decide not to answer some of the interview questions if you wish. You may also decide to withdraw from this study at any time by informing the interviewer. The relevant data will be destroyed.

You may be asked for clarification of issues raised in the interview some time after that, but you will not be obliged in any way to clarify or participate further.

We ensure the confidentiality of the information you provide. Your name or any other personal identifying information will not appear in any reports or publications associated with this study. All the data collected from the interview will be stored in accordance with the UK Data Protection Act. Only the researcher can have the access to them. The data will only be used for this PhD research project and relevant publications.

If you have any questions, please do not hesitate to ask.

Jiang Yang

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Appendix 8. Respondent consent form

Respondent Consent Form

Title of research: Exploring the relationship between innovation and job quality: evidence from China

	Please tick
I confirm that I have read and understand the participant information sheet about the study: "Exploring the relationship between innovation and job quality: evidence from China".	Yes / No
I have had the opportunity to ask questions related to the study and have received answers satisfactorily.	Yes / No
I confirm that my participation is voluntary and I am free to withdraw my consent at any time.	Yes / No
I understand that the data collected in the interview will only be used for the purpose of this PhD research and associated publications. Quotations will be kept anonymous.	Yes / No
I give permission for the interview to be audio taped.	Yes / No
I understand the data collected in the interview will remain confidential and will be kept safely with restricted access.	Yes / No
With full knowledge of above issues, I agree to take part in this study.	Yes / No

Participant

Name: ....

Signature: ....

Date: ....

Consent taken by

Name: ....

Signature: ....

Date: ....

Appendix 9. Table of interviewees

Company	Industry	Enterprise type	Interviewee position	Interview date