

Original citation:

Kunc, Martin and O'Brien, Frances A.. (2017) Exploring the development of a methodology for scenario use : combining scenario and resource mapping approaches. Technological Forecasting and Social Change. doi: 10.1016/j.techfore.2017.03.018

Permanent WRAP URL:

<http://wrap.warwick.ac.uk/87744>

Copyright and reuse:

The Warwick Research Archive Portal (WRAP) makes this work by researchers of the University of Warwick available open access under the following conditions. Copyright © and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable the material made available in WRAP has been checked for eligibility before being made available.

Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Publisher's statement:

© 2017, Elsevier. Licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International <http://creativecommons.org/licenses/by-nc-nd/4.0/>

A note on versions:

The version presented here may differ from the published version or, version of record, if you wish to cite this item you are advised to consult the publisher's version. Please see the 'permanent WRAP url' above for details on accessing the published version and note that access may require a subscription.

For more information, please contact the WRAP Team at: wrap@warwick.ac.uk

**Exploring the development of a methodology for scenario use: combining
scenario and resource mapping approaches**

Martin Kunc and Frances A O'Brien

Warwick Business School

Technological Forecasting & Social Change (2017)

<http://dx.doi.org/10.1016/j.techfore.2017.03.018>

Abstract

Scenarios are tools that help managers to identify critical uncertainties and describe possible futures; they typically focus on an organisation's external environment. Scenarios are often used by organisations to explore how their external environment may develop in the future and to consider its impact on their strategy. However, in order to develop strategy, an organisation needs also to consider the internal environment, in terms of its resources and capabilities, such as that presented within the Resource-Based View of the firm (RBV). This paper proposes a novel methodology for enhancing the scenario method through its serial integration with a method from the RBV field, namely that of resource mapping. The methodology provides the ability to support the "rehearsal" of a firm's strategic performance over time by exploring how the firm's resources and capabilities interact with the competitive environment and with the various scenarios. We illustrate our proposed method with an example of its use in a teaching setting by a group of postgraduate students along with a short description of its application within a company. We reflect on the design of the method and the early experiences of using it. The main contribution of the proposed method is that it provides an integrated approach linking scenarios with strategy development and evaluation. The paper ends with suggestions for further research.

Keywords: scenario use; strategy development; resource based view; resource mapping; system dynamics

Introduction

Scenario planning has for many years been considered one of a number of tools used by managers to support the development of an organisation's strategy (Rigby & Bilodeau, 2007). Strategies are typically assessed against scenarios using criteria such as resilience or robustness (Ringland, 2006; Wilson, 2000). However assessing the implications of strategies and their performance against a set of scenarios is a non-trivial task, which participants in many scenario exercises find difficult for a number of reasons including the inherently complex nature of the future environment that has been captured across and within the scenarios and also given the limited information processing capacity we have as humans (Wright, Cairns & Goodwin, 2009). Wilson (2000) observes that considerable skill is needed when using scenarios to develop strategy and that such skill can be helped by templates, primers and step-by-step approaches. Some authors have proposed that additional tools be 'added on' to the scenario process to help develop and evaluate strategies using scenarios (e.g. Schoemaker, 1992; Goodwin & Wright, 2001; Montibeller, Gummer & Tumidei, 2006). In this paper we contribute to this body of knowledge by proposing a novel 'add-on' method that draws on developments and methods from the strategic management and system dynamics fields to be able to rehearse the strategic performance of the firm under different scenarios. The proposed method can be used in either strategic development courses (O'Brien, Dyson and Kunc, 2011) or strategic planning processes in industry (Schoemaker, 1997).

The paper begins with a review of relevant literature. First we explore the scenario literature in relation to the use of scenarios to develop strategies and strategic options. Next we

introduce concepts from the Resource Based View of the firm, from the strategic management literature, along with the method of resource mapping. Then a methodological integration between the scenario methodology and resource mapping is proposed. We illustrate the proposed method with two examples, one drawn from a recent postgraduate course where students were taught the methodological integration and the other from a short account of project within a company. We then reflect firstly on the development of the method in relation to the literature and secondly on the student and real application experiences. The paper ends with some suggestions for further research.

Literature Review

Scenario planning

Scenarios are “tools for foresight” (de Geus, 1997) which help people to explore the future. Burt & Van der Heijden (2003) identify four purposeful reasons for developing scenarios, one of which is to support the development of robust strategy or strategic options; some go so far as to say that scenarios are the link between the future and strategy (Lindgren & Banhold, 2003). In the context of strategy support, scenarios also help managers to explore how their external environment may develop into the future so that current and future strategic options can be tested or wind-tunnelled against the set of scenarios to see how robust they are.

A variety of different approaches exist for developing scenarios. In making sense of this variety of approaches, classifications or groupings have been proposed; for example Bradfield et al (2005) identify three groups or ‘schools’ of scenario planning. O’Brien & Meadows (2013) note that whilst there is a variation in the content of the different approaches, they typically cover three phases:

- A *preparatory* phase where the purpose and focus of the exercise is agreed and driving forces are identified.
- A *development* phase involving the development of the scenarios
- A *use* phase when the scenarios are used for their intended purpose (O'Brien & Meadows, 2013, p643)

The variety of approaches that exist covering the first two phases are well documented in the literature (see for example, Ringland 2006; Varum & Melo, 2010; Bishop, Hines & Collins, 2007). Here we consider how scenarios are used, with particular reference to their use for strategy development. O'Brien & Meadows (2013) expand their description of scenario use into three further stages related with strategic development processes:

- Understanding the implications of the scenarios
- Developing strategic options
- Evaluating strategic options

O'Brien & Meadows (2013) also note that the advice given in the literature for the use phase varies from the use of prompting questions such as 'what strategy alternatives are suggested by each scenario?' (Fahey & Randall, 1998) through to the application of additional methods or frameworks, e.g. SWOT. Table 1 illustrates a variety of approaches found in the literature for supporting the three stages of scenario use.

Stage of scenario use	Approach	Examples
Understanding the implications of the scenario	Identify the major opportunities and threats inherent in each scenario	SRI International (Ringland, 1998) O'Brien et al (2007)

	Identify Key Success Factors crucial to survival or competitive advantage	Schoemaker (1991)
	PESTEL & Resource analysis	Walsh (2005)
	Identify market and customer needs	Ringland (1998)
	Assess impact of scenarios on Porter's five forces & Resources	Tapinos (2012)
Developing strategic options	Review focal issue/decision in the light of the scenarios	Schwartz (1991)
	Prompt - What strategy alternatives are suggested by each scenario?	Fahey & Randall (1998)
	Analysis of competition followed by strategic segmentation	Hadfield (1991) Schoemaker (1997)
	Core competences and capabilities	Van der Heijden (2005) Schoemaker (1992, 1997)
	SWOT/TOWS analysis	O'Brien et al (2007)
Evaluating & Rehearsing options	Prompt – how does the decision look in each scenario?	Schwartz (1991)
	Evaluate each option against selected criteria: Vision alignment / Utilisation of organisational strengths / fit with environment Vision alignment / robustness / stakeholder reaction Feasibility (given resources) / Acceptability (to stakeholders) / Suitability (fit with environment)	Lindgren & Banhold (2003) O'Brien et al (2007) Tapinos (2012)
	Creation of a strategy/scenario matrix to evaluate robustness of options and fit of strategies to scenarios.	Fink et al (2005)
	Develop core capabilities matrix to assess their performance across strategic segments and scenarios, for synergy and robustness	Schoemaker (1992)
	Multi criteria decision analysis for evaluating strategic options taking into account decision-makers' multiple conflictive objectives in order to design robust options	Goodwin & Wright (2001) Montibeller et al (2006)
	Real options Analysis to perform an integrated risk management process involving the identification of the full range of exposures across the portfolio of businesses due to uncertain futures.	Miller & Waller (2003)

Table 1: Examples of approaches for supporting the three stages of scenario use

Given the emphasis of this paper on the latter two stages of scenario use for strategy support, we briefly reflect on the methods noted against these in Table 1. Perhaps the most

straightforward approach to strategy development is the prompt: what should we do in each scenario or how is the focal issue/decision affected by each scenario? Others suggest more formal analyses to support the generation of potential strategies/options. For example, Schoemaker (1992) suggests that an analysis of the organisation's competition and a strategic segmentation are undertaken post scenario development (but independent of the scenarios). These two analyses are then brought together into a core capabilities matrix where the strategies are evaluated against the scenarios and their impact on capabilities noted. Other authors use approaches that explicitly draw on the scenario implications (e.g. the opportunities and threats) to generate / develop the strategic options. For example O'Brien et al (2007) advocate the use of a TOWS matrix to systematically consider how future opportunities and threats generated by the scenarios might be combined with the organisation's current strengths and weaknesses in order to develop a collection of potential strategic options. In this paper we further develop this approach by using recent developments in the area of strategic management and in particular the resource based approach of resource mapping to formally assess the organisation's strengths and weaknesses.

It is worth noting that the approaches listed under the heading evaluating and rehearsing options typically evaluate the options against the scenarios and other criteria. Such evaluations are typically static in that they do not conduct an analysis of the performance of the options over time. Hence, they do not rehearse the performance path of the organisation for the different scenarios.

In the next section, we introduce the concept of resource based strategies and the use of resource mapping to model them and rehearse the performance of the organisation over time using either resource mapping or system dynamics.

Resource-based strategies

The resource-based view (RBV) of the firm suggests that a firm's performance is determined by the strategic decisions responsible for developing a system of resources and capabilities over time (Barney, 1986, 1991; Kunc & Morecroft, 2009, 2010). Resources can be tangible (customers, staff, or production capacity) and intangible (reputation, corporate culture, intellectual property) productive factors. More specifically, resources are the assets which an organization possesses, controls or to which it has access (Fink et al, 2005). Capabilities are activities that an organization performs; and, usually, capabilities are generated by the interaction of resources combined with knowledge about the combination of these resources (Kunc & Morecroft, 2010; Fink et al, 2005).

While the RBV literature suggests that resources are the pillar of an organizations' strategy since they can provide a competitive advantage over time (Barney, 1986, 1991), the time horizon considered in scenario planning exercises may erode the value and capacity of resources to sustain a competitive advantage over time, e.g. technological changes can help competitors to replicate the functionality of existing unique resources or consumers may abandon products making the resources committed to them valueless (Schoemaker, 1997). As Collis and Montgomery (1995) suggest "a resources that is valuable...at a particular time might fail to have the same value in a different industry or chronological context". In other words, scenarios can provide an important clue about the resilience of the conditions determining the strategic value of resources (Tapinos, 2012). Consequently, scenarios can be

employed to assess the internal resources with respect to threats and opportunities arising from future changes in the environment as Collis and Montgomery (1995) suggest.

There is another issue to consider in resource-based strategies. The process of determining the resource profile is not straightforward since resources and capabilities need to be combined to deliver products which lead to complex systems of resources (Kunc & Morecroft, 2009, 2010). Therefore, the managerial process of conceptualizing the resource profile needs support for a number of reasons. First, the environment that managers are facing is uncertain and complex and there are often delays in seeing the resultant effect of managerial decisions (Adner & Helfat, 2003). Thus, the relationship between managers' decisions and the decision outcomes is usually ambiguous (Powell, Lovallo & Caringal, 2006). Second, managers with limited cognitive abilities engage in simplifying heuristics generating blind spots (Zajac & Bazerman, 1991) and cognitive biases (Das & Bing-Sheng, 1999). Third, managers perceive and interpret particular present and future information differently and have different strategic insights even in situations when similar analytical frameworks are used (Gavetti & Levinthal, 2004). One fundamental challenge is that managers within the same organization are likely to have different interpretations of the adequate resources and capabilities in the face of uncertain futures (Kunc & Morecroft, 2010). System Dynamics has been increasingly employed to support resource-based strategies in recent years to address these challenges.

The development of Resource-based strategies using System Dynamics

Managerial decision making and firm dynamics have always been fundamental to system dynamics research (Gary et al. 2008). System dynamics (SD) shares some of the behavioural and process assumptions of the Resource Based View (RBV) (Gary et al. 2008), stressing the importance of tangible and intangible firm-specific resource stocks, the associated

accumulation processes, and the bounded rationality of managers (Dierickx & Cool, 1989). To address the question of resource profile conceptualization, SD authors have developed a process or methodology to elicit the understanding of the system of resources, determine the information managers consider making decisions, and to formulate policies for resource investment (Kunc & Morecroft, 2009, 2010; Kazakov & Kunc, 2016). The name given to this methodology is resource mapping and its output is known as a resource map (Kunc & Morecroft, 2009).

Resource mapping is a facilitative device that can be used by individuals or groups; it is a qualitative methodology developed to help managers visualize the system of strategic resources, the resource profile, based on the SD concepts of stocks, flows and feedback processes (Kunc & Morecroft, 2009). Resource maps aim to represent the resources and their accumulation rates (investment rates), as well as their linkages, using specific graphical notation. This representation is used to make explicit managers' knowledge about the resources that are strategically relevant and to facilitate (group) discussion about their relevance and management during strategy implementation processes (Kunc & Morecroft, 2009). Thus, resource mapping reflects the integration of RBV and SD but it does not necessarily lead to a quantitative model as one might expect with traditional SD modelling. Coyle (1999), writing on the use of qualitative system dynamics, argues that describing a system can be a useful thing to do when it leads to better understanding of the problem in question.

The process of developing a resource map involves three stages which are summarised in Table 2. As can be seen in Table 2, the objective of the activities is for the participants to achieve a shared understanding, or strategic alignment, of the drivers of current performance of the firm.

Stage	Activities
1. Identifying resources and capabilities of the firm	During a workshop, participants identify resources/capabilities which they believe are fundamental for the strategic performance of the firm.
2. Assessing the strength and importance of the resources and capabilities	Participants discuss a numerical evaluation (1 to 10) for each of the resources/capabilities in terms of their strategic importance and relative strength with respect to competitors. The evaluation is plotted on a graph where each dimension forms one of the axes. It is helpful to also plot the mid-way scores on each dimension thus creating four quadrants. Each quadrant shows the resources/capabilities in terms of their importance and strength.
3. Mapping resources and capabilities	Using specific notation, participants prepare a resource map considering the resources and capabilities identified in the previous stage in four steps. First, they map the resources as boxes. Second, they represent the processes, as flows, responsible for building or eroding resources, e.g. investment in R&D builds the portfolio of patents (resource), or eroding resources, e.g. bad product quality reduces company reputation (resource). Third, the causal relationships between resources and flows are depicted through the use of arrows indicating the direction of the causal linkage (e.g. resource A affects resource B), and the type of linkage (positive, an increase in resource A increases resource B, or negative, an increase in resource A decreases resource B). Fourth, potential feedback processes, which are circular causal relationships, between resources and flows are recognized and labelled as either reinforcing (growth) or balancing (stagnation).

Table 2. Resource mapping process

Combining Scenario Planning and Resource Mapping

An explanation of the approach

The process of combining scenarios with resource mapping involves a number of stages which are summarised in Table 3 below. The starting point for the process is post scenario development, and in particular after the consideration of the implications of the scenarios and identification of the opportunities and threats. The first four stages (except stage 3) are the same as those employed to develop the resource map as indicated above in Table 2. Stage 5 integrates resource maps and the insights from scenarios through connecting external factors to the dynamics of resources and capabilities. The external factors are drawn

from the set of factors used to develop the scenarios. The factors are characterised by two key features: they are external to the organisation and thus beyond its control; and are deemed to be relevant to the organisation within the time horizon of the scenario exercise. Typically these factors are those which were instrumental in selecting and developing the scenario themes; they may represent changing social, economic, political, regulatory, technological or competitive issues that the participants believe are important to the organisation's future development. The external factors are included in the map as variables which directly affect the resources/capabilities. One of the main benefits of this integration is to have a clear trail between the threats and opportunities arising from the scenarios and their impact in the resources and capabilities of the business since threats and opportunities can have different impact depending on the resources and capabilities that they affect. Stages 6 and 7 generate key contributions from resource maps to the process of scenario planning. By following the impact of changes in the external environment across the resources and capabilities, managers can visualize how the company may perform under the different scenarios; as Schoemaker (1997) notes, resource maps can lead to narratives about the future performance of the business under different scenarios (and also under different strategies) that can be easier to comprehend and use. Moreover, since resource mapping is based on systems thinking principles, there are similar epistemological roots with the scenario literature (Fink et al, 2005; Wright et al, 2009). The proposed integration of quantitative system dynamics modelling with scenario use, which is presented in stage 7, follows the principle of modelling for learning (Morecroft, 1999; Lane, 1992). This is quite different from the traditional view of models as tools for forecasting, prediction and/or optimising developed by specialists to give answers for policy makers (Morecroft, 1999). In modelling for learning projects, "the resulting models give the clients the ability to check the coherence of their ideas by considering consistency and consequences" (Lane, 1992; page 70). In

System Dynamics models can be employed to support narratives (Guhathakurta, 2002) or develop quantitative evaluations of the strategic performance of the firm, when it is visualised as a system of resources (Kunc and Morecroft, 2010).

Stage	Activities	Commentary
1. Identifying resources and capabilities of the firm	Participants identify resources/capabilities which they believe are fundamental for the strategic performance of the firm.	There may be different points of view generated given the diverse backgrounds and functional areas of participants about which the resources/capabilities are responsible for the strategic performance. This activity aims to obtain strategic alignment between the participants of the scenario planning process.
2. Assessing the strength and importance of the resources and capabilities	<p>Participants discuss a numerical evaluation (1 to 10) for each of the resources/capabilities in terms of their strategic importance and relative strength with respect to competitors. The evaluation is plotted on a graph where each dimension forms one of the axes. It is helpful to also plot the mid-way scores on each dimension thus creating four quadrants. Each quadrant shows the resources/capabilities in terms of their importance and strength.</p> <p>Resources/capabilities in the quadrant where both dimensions are high indicate the need for careful consideration in terms of their dynamics during the scenarios. Resources/capabilities in the quadrant where importance is high but strength is low need to be either developed or disinvested depending on their usefulness in the scenarios. Resources/capabilities which are low importance now may need to be discussed if they may become important in the future under the results of the scenarios</p>	While all resources/capabilities may be considered important, there are variations in the interpretation of their level of importance and relative strength. The diverse interpretations arise due to the lack of similar information about a specific resource/capability so the objective is to achieve strategic alignment among the team in terms of strong and weak resources/capabilities.
3. Developing strategic options	The development of the strategies is performed using a TOWS matrix; this connects internal aspects of the business (current strengths and weaknesses identified in stage 2) with external factors (future threats and opportunities) identified in the scenario exercise.	This stage follows the Warwick method (O'Brien and Dyson, 2007) where the strengths and weaknesses are identified from an analysis of the current resources and capabilities and the opportunities and threats are identified from the scenarios of the future external environment. These SWOT elements are then systematically considered to suggest potential strategic options under the headings SO/WO/ST/WT.

<p>4. Mapping resources and capabilities</p>	<p>Participants prepare the resource map in four steps.</p> <p>First, they lay out the resources (boxes).</p> <p>Second, they identify the processes (flows) responsible for building or eroding resources, e.g. investment in R&D builds the portfolio of patents (resource), or eroding resources, e.g. bad product quality reduces company reputation (resource).</p> <p>Third, the relationships between resources and flows are depicted through the use of connectors (lines) which contain the direction of the linkage, e.g. cash (resource) influences on the investment in R&D (flow), and the type of linkage (positive, an increase in resource A increases resource B, or negative, an increase in resource A decreases resource B).</p> <p>Fourth, feedback processes between resources and flows are recognized and labelled as either reinforcing (growth) or balancing (stagnation), e.g. cash influences investment in R&D which helps to develop patents employed to launch new products increasing the amount of cash in the future leading to growth (reinforcing feedback).</p>	<p>The reason for mapping resources in scenario planning is to understand how the impact of scenarios on the resources / capabilities can affect the whole business given resources and capabilities are interconnected.</p> <p>In addition to the previous reason, resource mapping provides a platform for understanding the future performance paths for the company under the different scenarios.</p>
<p>5. Mapping the impact of external events on resources and capabilities / Integrating the insights from scenarios</p>	<p>Once the resource map is completed, participants connect the internal aspects of the business (resources and capabilities) with the external environment (factors identified during the scenario process). We recommend that as a minimum, the 2 or 3 scenario variables that were instrumental in developing the themes are used in this stage.</p> <p>Participants lay out the scenario variables next to the resources/capabilities that can be directly affected by them, e.g. new technological advances (scenario variable) affect the portfolio of patents (resource).</p>	<p>This stage implies the connection between internal aspects of the business (resources/capabilities) with external factors (scenarios variables) which are responsible for threats and opportunities. Consequently, the team can monitor the impacts of external factors and how the impacts will play out affecting the performance of the business in terms of resources and capabilities.</p>

<p>6. Rehearsing future performance paths</p>	<p>Having completed the resource map with the impact of scenarios on resources/capabilities, participants can rehearse and test the future performance paths for the business.</p> <p>In essence, rehearsing strategies using the resource maps consists of following the linkages between resources and understanding the accumulation processes for the different resources/capabilities. We call this process: conceptual simulation.</p> <p>There are two activities related to future performance paths. The first activity is to understand if the strategies are internally and logically consistent. The second activity is to evaluate the robustness of internally and logically consistent strategies in the face of external changes (and different futures?) ie in the face of the scenarios.</p>	<p>There are a number of reasons for rehearsing strategies using resource maps. , For example, while a verbal account of the strategy may make sense, rehearsing a strategy by following its impacts through the feedback processes on the set of resources/capabilities can identify undesired consequences.</p> <p>Additionally, tracing the impact of changes in exogenous factors into the business can provide with an audit trail to understand the future performance of the firm.</p> <p>Logical consistency is considered in terms of dynamic performance, for example, can a strategic option suggesting price reductions be consistent with additional investment in R&D?</p> <p>The test of robustness considers the collection of logically consistent strategic options in the light of set of scenarios. Those strategies that are logically consistent may not be robust across the set of scenarios.</p>
<p>7 Presenting the results from rehearsing strategies</p>	<p>Results may be presented in two ways: using either a qualitative approach or by following a quantitative approach.</p> <p>If the participants are satisfied with qualitative insights, the conceptual simulation exercise can be explained using a story-telling approach to narrate the organization's different performance paths in the face of uncertain future ie under the different scenarios. Story-telling can be supported by an explanation of future intuitive trends of resources, capabilities together with the scenario variables.</p>	<p>The purpose of this stage is to communicate the future performance paths in the best way possible for the different stakeholders in the company, hence the option of developing a qualitative or quantitative analysis or both.</p> <p>It is important the results are intuitively accepted in order to enhance the process of sense making (to detect early signs in trends) and speed up reaction times in decision making.</p>

	<p>However, if the participants need numerical results, the resource map can be converted into a System Dynamics model (Sterman, 2000). In this case, the process may extend to gather data and develop the equations behind the resource map in order to develop a quantitative model.</p>	
--	---	--

Table 3. Stages for developing and using Resource Maps to complement Scenario Planning

Approaches in scenario research

We illustrate our proposed integration of resource maps with scenario planning through two recognised approaches for scenario research: academic and business experiences (Wright et al, 2009). Using reports on teaching experience is not new in the area of scenario research (see for example: O'Brien, 2004, Wright et al. 2009). Our focus here is to observe the suitability of the new approach because pedagogical aspects of scenario learning have been addressed previously by O'Brien (2004) and Wright et al (2009). The combined scenario & resource mapping approach described in this paper has been used in our teaching over the past four years with more than 100 undergraduate and postgraduate students. The modules where the method is taught take students through the methodology described above; they then apply the methodology to an organisation selected by the lecturers and develop scenarios and strategic options (O'Brien et al, 2011). Students work through the process in groups and produce a written report describing their analyses and strategic recommendations for the company. In terms of business experience, an important proportion of recent papers present empirical applications of scenario planning based on observations obtained from scenario planning projects (Varum and Melo, 2010). These empirical papers are accounts of the use of the methodologies and the outputs obtained after the scenario project with limited descriptions of learning aspects (Varum and Melo, 2010).

Two illustrations of combining scenarios and resource mapping

Teaching experience: The Case of Bookstores

The example that we have included here describes the experiences of one postgraduate group (business students) which were allocated a book selling company. Bookstores is a book retail

chain in the UK established in the 1980s. The essence of its bookstore is that it is strategically located; it has an inviting vibe and is designed uniquely, keeping in mind the trends and requirements of the neighbourhood. Bookstores has been facing a few challenges over the past few years. Despite its presence in the market as a high street bookseller, Bookstores lacks the same presence in e-book market. In an e-book market where competitors have strong presence, it is a definite threat for Bookstores. It is this backdrop of challenges facing the industry that helped the group forms their focal issue for the scenario exercise: how could Bookstores survive & thrive in this changing marketplace in the next 10 years?

Scenario Development. The scenario method taught to the students follows that described by O'Brien et al (2007) and is based on the intuitive-logics school (Bradfield et al 2005). A collection of factors that define Bookstores' external environment were generated as part of a group discussion. More than 40 factors were generated and the PESTEL (Political, Economic, Social, Technological, Environmental and Legal) framework was used to check that a good variety of factors had been covered. An uncertainty/importance matrix was used to prioritise the number of clustered factors; the group selected a reduced number of factors for their scenario development based on their characteristics of high importance and high uncertainty. The 12 factors they chose included 9 uncertainties and 3 predetermined trends which are 'Age distribution of UK population', 'Seasonality of sales' and 'Advancement of technology'. The group identified three key uncertainties, which they used to help them develop their chosen themes. Three scenarios were developed by the group and given the themes: The New Digital Age (X); Nostalgia (Y) and The Reading Society (Z). The detail of the factor values in each scenario is shown in Table 4; the three key uncertainties identified above are highlighted in bold.

Factor	Description	Range of values for each scenario factor		
Growth of e-books/online education market	E-books already have a presence in the market at the moment. In the future, the e-book markets will grow either slowly or rapidly.	Stable	2.....3.....1	Rapid
Consumer perception of bookstores	Consumer's perception towards bookstores ranges from unfavourable to favourable.	Unfavourable	3 1...2.....	Favourable
Cost of store maintenance (i.e. Property rental price)	It factors the overhead and maintenance costs that a store bears, and ranges between low and high, i.e. property rent, utilities, etc.	High	3.....2.....1	Low
Government policy on VAT for e-books	Different rates of VAT are applied according to different types of items. Currently, published books have 0% VAT, whereas digital services have different rates of VAT. E-books in particular have 20% VAT	0%	1...3.....2...	Higher than 20%
Carbon reduction awareness	Accounts for the environmental responsibility towards the society. It is ranged on a scale of people having low awareness of the issue to high awareness.	Low	...2...3...1...	High
Leisure trend	Balances between individualistic personality and lifestyle. A person might be more inclined to reading as a personal choice and the surroundings might have very little or no influence on it or it could completely be lifestyle driven, where the inclination comes from status, family and socio-economic factors.	Individual	...2...1...3...	Lifestyle
Piracy restriction	Government's policy against the issue of piracy ranges from restricted to unrestricted.	High	.3...1.....2...	Low
State of UK economy	It ranges between stagnancy and growth. It is an important factor because the state of a country's economy often has influence on	Stagnant	.3...2...1.....	Growth

	consumer lifestyle and purchasing power.			
Sales of used books	The level of used book sales ranges from low to high.	Low	..1...2...3.....	High
Age distribution of UK population (trend)	10 million people were over 65 years old in the UK as of 2008, and it was projected that this number would reach about 19 million by 2050. Age has an effect on income and spending habits. Therefore the age distribution of the UK population was taken into account as a factor, and more specifically in some of the scenarios, subdivided into ‘working population’ and ‘aging population’.	Aging		
Seasonality of sales (trend)	Consumers tend to purchase presents for each other on festive occasions such as Christmas, Valentine’s Day etc. Sales of books is influenced by these seasonal celebratory events, and booksellers consider these sales as performance index.	Start of school year / Holiday		
Advancement of technology (trend)	Development in technology, i.e. electronic gadgets, digital services, etc. affecting reading and purchasing of books habits.	Continuous change		

Notes: Scenario 1 – The New Digital Age (1) / Scenario 2 – Nostalgia (2) / Scenario 3 – The Reading Society (3)

Table 4. Scenario Variables for Scenarios

The first two narratives were presented as cross-sectional snapshots of the future; the third narrative was presented as an unfolding timeline explaining the trajectory of the future from the present. Table 5 contains a brief description of the three scenarios.

Scenario 1 – The New Digital Age. The future belongs to the e-book market and digitalisation is commonplace in the society. The narrative reflects some of the advances: “I was again fascinated by how technology has advanced over the years and replaced many manual functions. In the café, a tablet was attached to my table that displayed the menu and a facility for me to order and pay with a click, saving an abundance of time. People are still reading books as often as before, but I noticed there was little sign of a paper book... Long hour trains now have a reading area that provides kindles, kobos and allows passengers to kill

time by getting access to an online library. People are seen using their devices to read everywhere in public.”

Scenario 2 – Nostalgia. The scenario suggests that by 2025 the e-book fashion has faded because most readers have realised that e-books are not a satisfactory substitute for printed books. However, economic conditions have put a lot of bookstores out of business. The narrative is: “...But I feel a lot of the bookstores have disappeared over the years, especially from the high street... I’m not sure whether to call it a bookstore or a multi-purpose store. These stores have so many different items that make my eyes spin!... The leisure of sitting in a bookstore for hours playing treasure hunt amidst bookshelves while sipping your favourite coffee from the store’s café is a perfect way of revitalization.”

Scenario 3 – The Reading Society. A virus has changed the leisure trend in 2025 so indoor activities are more preferred to outdoor activities due to the fear of contagion. Hence, reading is more popular than ever. The narrative is: “The Office for National Statistics (ONS) announced last month that reading has become one of the most common pastime activities nowadays in the UK... With increasing enthusiasm for reading, people have been reading both e-books online and hardcopy at home. Young people are quite into reading online as online education market has grown due to the continuing development of technology... In terms of books, people are encouraged to buy used books whenever options are available. ”

Table 5. Scenario description and narratives

The group captured the impact of each scenario as a collection of opportunities and threats;

Table 6 illustrates the future opportunities and threats identified from scenario 1.

No.	Opportunities (O)	Threats (T)
1	Substantial sales growth in online stores	Illegal downloading websites
2	Lower expenses for physical stores	Fierce competition (e.g. Amazon)
3	Increased demand for complementary products	New entrants in the market can threaten Bookstores’ market presence and profit share
4	Less revenue lost due to illegal download of books	Increase in the rental and storage costs
5	Demand for physical books still exist (among older consumers)	Decreased sales in bookstores due to booming digitalisation
6	Increased consumption (i.e. people shop more often)	Unsustainable current business model
7	Development of reading technology Growth in sales of physical books catering to dyslexic and blind population High demand for eco-friendly products Increased demand for used books	
8	Growth in sales of physical books	

	catering to dyslexic and blind population	
9	High demand for eco-friendly products	
10	Increased demand for used books	

Table 6. Impact of Scenario 1

Resource Mapping. The group followed the resource mapping process outlined in Table 3. After assessing the strategic important and relative strength of an initial list of resource and capabilities, see table 7, the group developed the resource map for the company in Figure 1 using all resources and capabilities listed in table 7.

Resources/Capabilities	Strategic Importance	Relative Competitive Strength
R1. Book catalogue	6	5
R2. Bookstores in prime locations	7	8
R3. In-store café shop	6	7
R4. Financial position (cash)	9	7
R5. Committed and skilled staff	9	8
R6. Brand/Reputation	7	8
R7. Customer base	7	6
C1. Customised local store design	8	9
C2. Teaming up with universities	7	7
C3. Customer support (recommendations)	8	6
C4. Diverse Range of books	7	6

Table 7. Resources and capabilities

The relationships between the different resources and capabilities form feedback processes which are responsible for the future performance paths of the firm. For example, there is a key balancing feedback loop between the investment budget and the financial position. While the financial position (cash available) initially helps to fund the investment budget leading to the growth of bookstores, training and other resources, such investment reduces the cash available. Over time, the financial position improves due to the effect of the investment in resources (bookstores, book catalogue, in-store café shop, committed and skilled staff) leading to more customers and revenues (additional cash). The resource map also contains the three key uncertainties used to drive the development of the scenarios with their

corresponding link to either a resource, (e.g. changes in consumer preference for bookstores can increase the expansion of bookstores), or to the financial performance, (e.g. changes in the government policy related to VAT for books can affect the sales of books limiting the funds available for further investment in other resources).

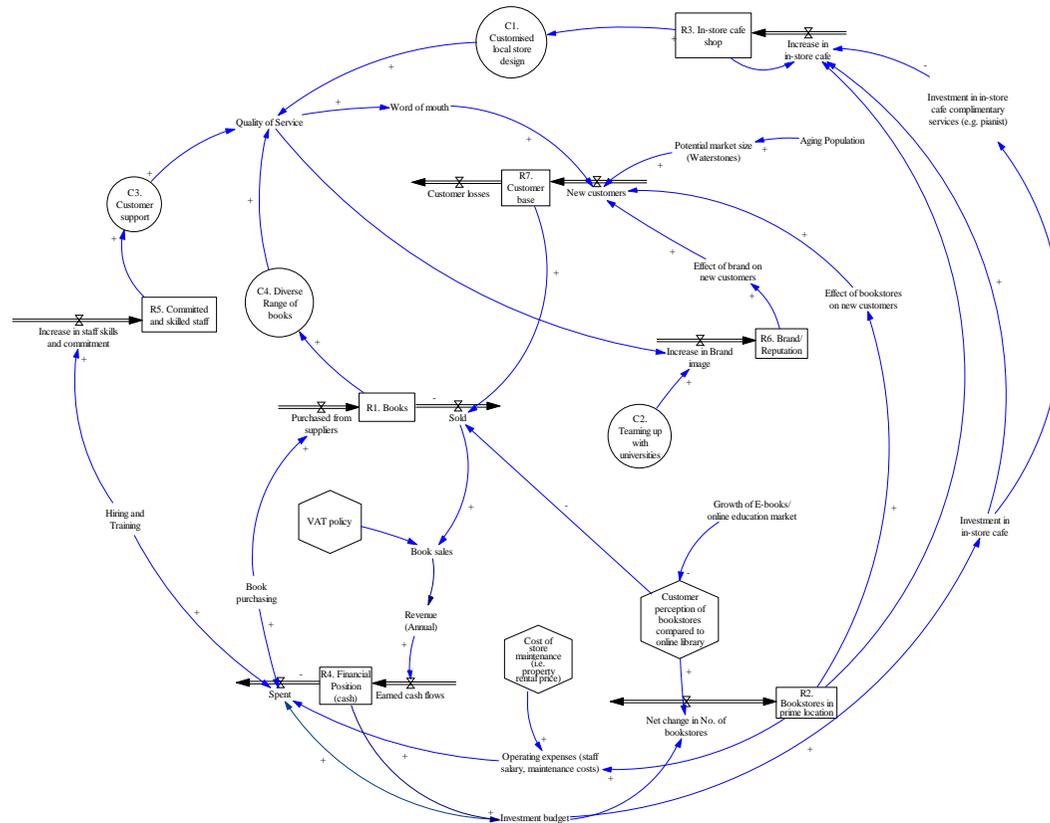


Figure 1. Resource Map containing all resources and capabilities identified in stage 4 with the three key uncertainties used to develop the scenario themes. See legends for the figure in the footnote¹

¹ The map reflects all resources using rectangles and capabilities using circles agreed by the group as strategically important (see table 7). Resources and capabilities have causal relationships presented as arrows with positive/negative signs depending on the impact on the performance. The map also present the three key uncertainties used to develop the scenario themes, which are represented as hexagons. Each resource has included the drivers of its change using double lines entering (arrow heads are inwards), if it shows an increase, or leaving (arrow heads are outwards), if it represents a decrease, the resources. The letters and numbers in resources and capabilities are related to the numbers employed in the table classifying them, see step 2 in table 2.

Rehearsing strategic options. Here we illustrate how one of the strategies generated using the TOWS matrix during stage 3 (table 3), can be rehearsed in each of the three scenarios following stages 6 and 7 in table 3. The strategy chosen consists of improving/expanding the in-store café shop. In terms of the resource map, the strategy can be simulated conceptually by changing the variable “Investment in in-store café” and tracing the implications through the relationships mapped out. Expanding in-store café shops enhances the quality of service, attracts customers through word of mouth and leads to higher sales. Therefore, the strategy is logically consistent. In terms of the impact of the scenarios on the performance of Bookstores, a similar process can also be implemented. For example, Scenario 1 indicates a favourable perception of bookstores (but mostly to serve as places to drink a coffee) but economic growth leads to higher property rental and cost of store maintenance. Also in this scenario, the government has a favourable VAT policy for books (0% VAT) but the digital market takes over printed books. While there is a favourable perception of bookstores as places to stay and the absence of VAT, the profitability declines due to higher rental and maintenance costs. The main challenge of scenario 1 therefore is to retain those bookstores whose maintenance costs remain low to maximise profits.

Intuitively, the performance path of Bookstores in each scenario can diverge given the impact of the external factors on profitability and, consequently, the investment funds necessary to maintain the resources responsible for attracting customers to purchase books. Figure 2, illustrates the expected performance paths under the different scenarios if Bookstores sets a target for a certain number of in-store café shops for its strategy. Scenario 2, paints a future with low growth in maintenance costs (and rents) due to low economic growth and favourable perception for bookstores but it is affected by a non-favourable government policy regarding VAT due to fiscal deficits originated by the poor economic growth. Such a

scenario offers the best performance path for investment in in-store café shops as it generates customers interested in spending some time in the store reading books because they may not be able to buy them due to the poor economic environment and high price. Scenario 3 includes a negative impact of online reading on consumer perception of bookstores, which together with a stagnant economy and the impact of the virus on consumer behaviour, will hinder the attainment of the Bookstores' objectives in terms of number of in-store café shops.

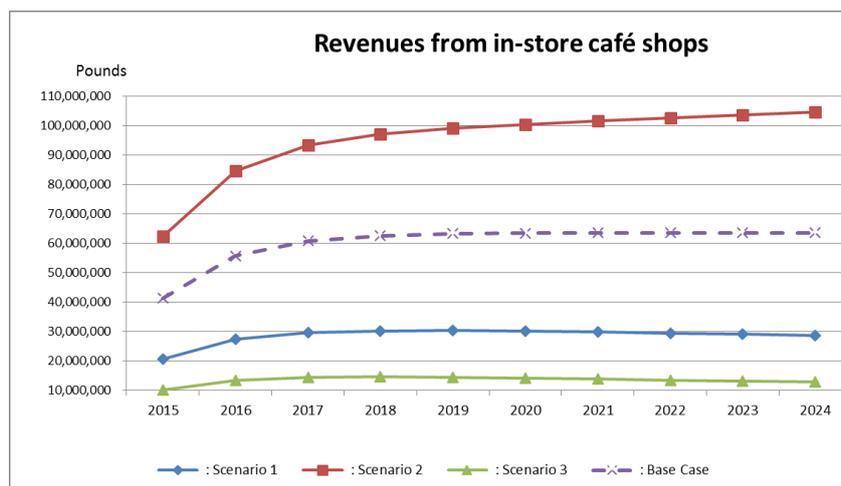
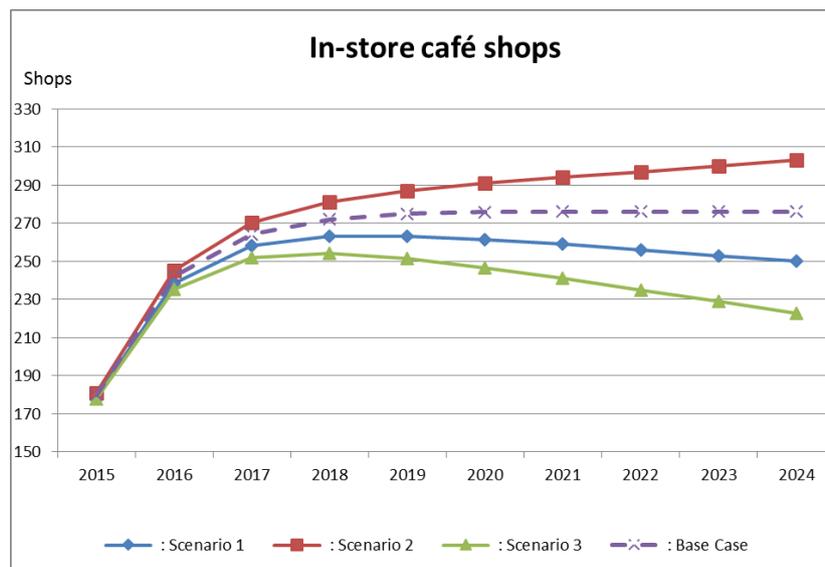


Figure 2. Future performance paths for their key resource (10 years) and revenues generated under the implementation of the strategy in current conditions (base case) and three scenarios.

This section has outlined a process for integrating scenarios with resource mapping with the purpose of providing support for the use of scenarios in developing strategic options. The section has also presented an example of how one group applied the process to assess one of their strategies against the set of scenarios they had developed.

Case Study: Energy Co

One of the authors supported a team of consultants on the use of scenarios to develop strategies for a utility company. The next paragraphs present highlights of the process followed to combine scenarios with resource mapping. **The context.** The technological transformation in energy represents a defining moment for utilities, which need to prepare properly to protect their traditional business and exploit the opportunities from new businesses. An intervention to develop a set of scenarios followed by subsequent strategy development was undertaken by one of the authors with a team of consultants and participants from the company, denoted here as 'Energy Co'. **The process.** Over a period of three months, the team ran a series of four workshops supported by the subsequent evaluation and analysis of materials obtained from each meeting. This work formed the basis for scenarios considering major driving forces over a 10-year time horizon. Two key factors were selected by the team to help develop the scenario themes: costs of new technology and policy and regulation of the energy sector fostering new technologies. The two factors were located on two axes which with some selected assumptions were used to develop a set of four scenarios (Wright and Goodwin, 2009). Next, the team identified the key threats and opportunities arising from the future-based scenarios. Following the steps indicated in table 2, the future opportunities and threats were combined with the current resources and capabilities using TOWS to generate a collection of potential strategies for Energy Co. The team then divided this collection of strategies into two groups: strategies addressing the threats (Red

Ocean strategies) and strategies to exploit the new opportunities using current resources and capabilities and new resources and capabilities, which were not existing in the firm (Blue Ocean strategies). The resulting resource map was transformed into a System Dynamics model to calculate quantitatively the future performance of the company under the Red and Blue Ocean strategies.

In the following section we review the process in relation to the existing literature on scenario use for strategy development.

Discussion

In this section we firstly review our proposed combination of scenario planning with resource mapping against the existing literature. We also reflect on the student experiences from the illustrated example provided in the previous section. Finally we identify some areas for further research.

Contribution to scenario literature

The process presented in this paper contributes to the scenario literature, particularly in the area of scenario use for strategy development; our proposed process provides an explicit link between scenarios and strategy (Wright et al 2009; Tapinos, 2012). We develop a novel approach to combining resource mapping with scenarios which can be used both to support the development of strategic options and to rehearse those options with respect to the scenarios. Resource mapping can provide a qualitative and/or quantitative assessment of the performance of each strategy under each scenario indicating potential trade-offs as well as logical consistency. We believe resource maps can improve the ability of decision makers to

address the dynamic complexity in the development and evaluation of strategic options since it offers the possibility to understand the causal linkages between external factors and internal resources (Kunc, 2008; 2011), as well as many of the concerns raised by Wright et al (2009), through the graphical representation of feedback processes responsible for the future performance of the organization. Wright et al (2009) argue about the need to exploit the complementary strengths in terms of the application of hard and soft methods through a sequential use of them with the soft preceding the hard method. In our proposed methodology, we demonstrate how ‘soft’ and ‘hard’ approaches may be combined. First we suggest the use of a qualitative assessment and mapping of resources and capabilities which when considered in the context of the scenarios can be used to generate strategic options. Second we suggest a quantitative rehearsal of options within a system dynamics model that integrates internal resources and capabilities with external factors drawn from the scenarios. The scenario method taught to the students follows that described by O’Brien et al (2007) and is based on the intuitive-logics school (Bradfield et al 2005). This method relies on the identification of key scenario variables that are instrumental in developing scenario themes. These key variables are used within the resource mapping stage to rehearse their impact on potential strategic options. Future research could explore how the use of other scenario development methods such as those of the Probabilistic Modified Trends and La Prospective schools identified by Bradfield et al (2005) impacts on the proposed method described in this paper.

Contribution to strategy tools literature

Our proposed process also contributes to the strategy tool literature and in particular to the deployment of SWOT. This tool has, over the years, come under some criticism (Hill &

Westbrook, 1997), essentially for not providing detail about how to use it in practice. As it stands, SWOT is simply a framework, consisting of headings which help the user to organise lists of strengths, weaknesses, opportunities, and threats that are typically generated through brainstorming activities of groups for example in strategy workshops. Previous accounts of the use of SWOT/TOWS analysis with scenario planning suggest identifying a list of strengths and weaknesses (O'Brien et al, 2007); however there is no formal requirement to link them with resources or capabilities. Our approach thus extends this literature by proposing a formalisation of the identification of all SWOT elements through the use of analytical approaches: resource mapping for the identification of the strengths and weaknesses; and scenario planning for the identification of opportunities and threats. Thus our approach provides an audit trail that can be used to justify the selection of all SWOT elements and which can be also used to explicitly link the scenarios with the strategies developed. Additionally, the methodology provides the ability to support "rehearsing" strategic performance over time by exploring how the firm's resources and capabilities interact with the competitive environment and each other as one or another scenario plays out.

Reflecting on the student experiences

Our experience with the integration of scenarios and resource mapping indicates features of the methodology that work particularly well and other aspects that need further refinement.

The key feature of the methodology that has worked well has been the explicit linkage of scenarios through strategy development and rehearsal. Virtually all of the groups that we have observed using the method find it quite easy to identify a rich collection of resources and capabilities for their organisation; they also undertake the evaluation of the resources and

capabilities well. We have noticed that these two stages of the methodology have helped students to be confident in identifying the current strengths and weaknesses of their organisation (stages 1 and 2 in table 3). The process of creating a resource map, e.g. linking resources, capabilities, flows and decisions, is usually performed well and we have observed very stimulating discussions about the performance paths identified from conceptually simulating the resource map using a story-telling approach (stage 7 in table 3).

Another interesting observation from our research is the existence of potential bias in the scenarios and the resources and capabilities identified. Previous research (O'Brien, 2004) identified a number of pitfalls that groups may fall into when developing scenarios, including 'future myopia' where participants' thinking is influenced by recent events. This is illustrated in the student scenarios where there is little evidence of considering disruptive elements beyond those immediately obvious to participants.

Another observation of potential bias that was observed in our research related to the development and use of the resource maps with students; these can suffer from the potential bias towards existing resources and capabilities in business rather than exploring other resources and capabilities in an unconstrained way. For example, the resource map for Bookstores does not show any resource related to online bookselling, which can be one option under certain scenarios. We have observed that students have a tendency firstly to focus only on resources and capabilities that currently exist rather than on any gaps that may be evident, and secondly they tend to focus on strong resources and capabilities (the first quadrant on the resource map – see stage 2) and not on either weak or future strategic resources and capabilities. One reason may be due to the subtleties of language. Previous

research has observed that participants undertaking SWOT analysis often confuse opportunities with strategies (O'Brien & Meadows, 2013). Here we suggest the very names resources and capabilities implies things an organisation has or is good at and that as such they lead participants to think in this way, rather than to think more broadly about the resources and capabilities an organisation in that situation might need. One reason may be that is that there is no clear evaluation of the competitors in the process. Schoemaker (1997) suggests the inclusion of competitive intelligence in the process of scenario planning, especially in the assessment of the strength/weaknesses of the resources. Further research could usefully explore how issues related to language influence how participants interpret the steps of the method. Other research could explore how an assessment of competitive forces could be combined with the approach proposed here.

A further and related aspect to consider in relation to the assessment of resources and capabilities is the time horizon for which they are assessed. The method proposed here advocates an assessment at the present time of the resources and capabilities to inform the identification of current strengths and weaknesses. However as noted above, there is a chance that resources and capabilities relevant under future scenarios may be missed. One potential solution to this issue was observed in the business experience where the project team decided to have the elicitation of resources and capabilities independently for Red and Blue Ocean strategies. In this case, the risk is the lack of alignment between both elicitation processes but the risk was eliminated when the project team compared both lists and discussed a final realistic set of resources and capabilities covering current and future business models. Future research could usefully explore how different time-based assessments of resource and capabilities may work and what impact they have on the development of future strategic options. For example, if some strategies might require the

development or acquisition of resources, the resource map may need to be modified to account for the new resources and the expected linkages with existing resources.

Reflecting on the business experience

In the case of the application within the company, the collection of resources and capabilities (stages 1 and 2 in table 3) was connected with the definition of strategies to defend the firm from threats (Red Ocean) and exploit opportunities (Blue Ocean). The process of creating a resource map, e.g. linking resources, capabilities, flows and decisions, was performed well and generated very stimulating discussions about the performance paths identified from the resource map using a story-telling approach (stage 7 in table 3). In the case of the application in the company, the resource map was developed together with the users but the project team generated a separated System Dynamics model (stage 7 in table 3) to calculate the performance over time of the firm considering the Red and Blue Ocean strategies under the different scenarios.

Van der Heijden (2005) recommends the inclusion of a ‘remarkable person’ in scenario exercises to help avoid the pitfalls that groups may succumb to; this has proved difficult to achieve with student groups and is something that future research could usefully address. In the case study, the project team brought a number of remarkable experts currently working within the industry but from other countries. The project team in the case tried to avoid bias in the selection of resources and capabilities by asking the company to address the opportunities thinking in terms of completely new businesses.

Conclusions

The scenario literature presents a variety of directions that managers can take post-scenario development. This paper adds to this body of literature by proposing a method that combines scenario development with resource mapping as an effective method for developing and rehearsing strategic options post scenario development. The paper summarised the methodology and presented an illustration of its use by business school students. Our experiences using the method suggest that the methodology can support the use of scenarios by grounding the development of strategies in a recognised view of firms: resources and capabilities. Moreover, the use of resource mapping can lead naturally to the modelling and simulation of diverse strategies and scenarios combining soft and hard methods in the process of strategic development.

References

- Adner, R., C. E. Helfat. 2003. Corporate effects and dynamic managerial capabilities. *Strategic Management Journal*, 24(10): 1011-1025.
- Barney, J. B. 1986. Strategic factor markets: expectations, luck, and business strategy. *Management Science*, 32(10): 1231-1241.
- Barney, J. B. 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17(1): 99-120.
- Bishop, P., A. Hines, T. Collins. 2007. The current state of scenario development: an overview of techniques, *Foresight*, 9: 5-25.
- Bradfield, R., G. Wright, G. Burt, G. Cairns, K. van der Heijden. 2005. The origins and evolution of scenario techniques in long range business planning, *Futures*, 37: 795-812.
- Burt, G., K. van der Heijden. 2003. First steps: towards purposeful activities in scenario thinking and futures studies, *Futures*, 35: 1011-1026.
- Collis, D.J. and Montgomery, C.A., 1995. Competing on Resources. *Harvard Business Review*, p.119.
- Coyle, G., 1999, August. Qualitative modelling in system dynamics or what are the wise limits of quantification. In *17th International Conference of the System Dynamics Society, Wellington*.
- Das, T. K., T. Bing-Sheng. 1999. Cognitive biases and strategic decision processes: An integrative perspective. *Journal of Management Studies*, 36: 757-778.

- Dierickx, I., K. Cool 1989. Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35(12): 1504-1511.
- Fahey, L., R.M. Randall. 1998. Integrating strategy and scenarios, in: L. Fahey, R.M. Randall (Eds.) *Learning from the future: Competitive foresight scenarios*, Wiley, Chichester.
- Fink, A., Marr, B., Siebe, A., J-P. Kuhle. 2005 The future scorecard: combining external and internal scenarios to create strategic foresight. *Management Decision*, 43(3): 360 -381
- Gary, S, Kunc, M, Morecroft J, S. Rockart. 2008. System Dynamics and Strategy. *System Dynamics Review* 24: 407–430
- Gavetti, G., D. A. Levinthal 2004. The strategy field from the perspective of management science: Divergent strands and possible integration. *Management Science*, 50(10): 1309-1318.
- de Geus, A. 1997. *The living company: growth, learning and longevity in business*, Nicholas Brealey.
- Goodwin, P., G. Wright. 2001. Enhancing strategy evaluation in scenario planning: A role for decision analysis, *The Journal of Management Studies*, 38: 1-16.
- Guhathakurta, S. 2002. Urban modeling as storytelling: using simulation models as a narrative. *Environment and Planning B: Planning and Design*, 29(6): 895-911.
- Hadfield, P. 1991. From scenarios to strategy, in *Strategic planning in Shell*.
- Hill, T. R. Westbrook 1997. SWOT analysis: It's time for a product recall. *Long Range Planning* 30(1): 46-52.
- Kazakov, R., M. Kunc 2016. Foreseeing the Dynamics of Strategy: An Anticipatory Systems Perspective. *Systemic Practice and Action Research*. 29(1): 1-25

- Kunc, M. 2008. Using Systems Thinking to Enhance the Value of Strategy Maps
Management Decision, 46: 761-778
- Kunc, M. 2011. Teaching Strategic Thinking using System Dynamics: Lessons from a Strategic Development Course. *System Dynamics Review* 28: 28-45
- Kunc, M. and Morecroft, J. 2009. Resource-based strategies and Problem Structuring: Using resource maps to manage resource systems. *Journal of the Operational Research Society*, 58: 191-199
- Kunc, M. and Morecroft, J. 2010. Managerial decision-making and firm performance under a resource-based paradigm. *Strategic Management Journal*, 31: 1164-1182
- Lane, D.C., 1992. Modelling as learning: a consultancy methodology for enhancing learning in management teams. *European Journal of Operational Research*, 59(1):64-84.
- Lindgren, M., H. Bandhold. 2003 *Scenario planning: The link between future and strategy*, Paalgrave Macmillan, Basingstoke.
- Miller, K.D., H.G. Waller. 2003. Scenarios, Real Options and integrated Risk Management, *Long Range Planning*, 36: 93-107.
- Montibeller, G., H. Gummer, D. Tumidei. 2006. Combining scenario planning and multi-criteria decision analysis in practice, *Journal of Multicriteria Decision Analysis*, 14: 5 - 20.
- Morecroft, J., 1999. Visualising and rehearsing strategy. *Business Strategy Review*, 10(3): 17-32.
- O'Brien, F.A. 2004. Scenario planning – lessons for practice from teaching and learning. *European Journal of Operational Research* 152, 709–722.

O'Brien, F.A., M. Meadows, M. Murtland. 2007. Creating and using scenarios: Exploring alternative possible futures and their impact on strategic decisions, in: F.A. O' Brien, R.G. Dyson (Eds.) *Supporting strategy: Frameworks, methods and models*, Wiley, Chicester, , pp. 406.

O'Brien, F.A., R.G. Dyson, M. Kunc, M, 2011. Teaching Operational Research and Strategy at Warwick Business School. *INFORMS Transactions on Education* 12: 4-19

O'Brien, F.A., M. Meadows. 2013. Scenario orientation and use to support strategy development, *Technological Forecasting and Social Change*, 80: 643-656.

Powell, T. C., Lovallo, D., & Caringal, C. 2006. Causal ambiguity, management perception, and firm performance. *The Academy of Management Review*, 31(1): 175-196.

Rigby, D., B. Bilodeau 2007. Bain's global 2007 management tools and trends survey. *Strategy & Leadership* 35(5): 9-16.

Ringland, G. 1998. *Scenario Planning: Managing for the future*, Wiley, Chichester.

Ringland, G. 2006. *Scenario Planning* 2nd ed., Wiley, Chichester.

Roney, C.W. 2010. Intersections of Strategic Planning and Futures Studies: Methodological Complementarities, *Journal of Futures Studies*, November 2010, 15(2): 71 – 100

Schoemaker, P.J.H. 1991. When and how to use scenario planning: A heuristic approach with an illustration, *Journal of Forecasting*, 10: 549-564.

Schoemaker, P.J.H. 1992. How to link strategic vision to core capabilities, *Sloan Management Review*, Fall 67-81.

Schoemaker, P.J.H. 1997. Disciplined Imagination. From Scenarios to Strategic Options. *International Studies of Management and Organization*, 27 (2):43-70

- Schwartz, P. 1991. *The art of the long view*, Doubleday, New York.
- Sterman, J. D. 2000. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. New York: Irwin-McGraw-Hill.
- Tapinos, E. 2012. Perceived environmental uncertainty in scenario planning, *Futures*, 44: 338- 345
- Varum, C, C. Melo. 2010. Directions in scenario planning literature - A review of the past decades, *Futures*, 42: 355-369.
- Van der Heijden, K. 2005. *Scenarios: The art of strategic conversation 2nd*, Wiley, Chichester.
- Walsh, P.R. 2005. Dealing with the uncertainties of environmental change by adding scenario planning to the strategy reformulation equation, *Management Decision*, 43: 113-122.
- Wilson, I. 2000. From scenario thinking to strategic action. *Technological Forecasting and Social Change* 65, 23-29
- Wright, G., Cairns G., P. Goodwin. 2009. Teaching scenario planning: Lessons from practice in academe and business. *European Journal of Operational Research* 194: 323–335
- Zajac, E. J., M. H. Bazerman 1991. Blind spots in industry and competitor analysis: Implications of interfirm (mis) perceptions for strategic decisions. *Academy Of Management Review*, 16(1): 37-56.