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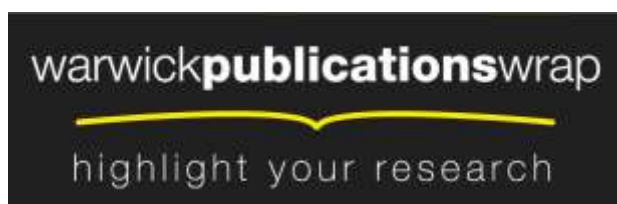
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**WMG Service Systems Research Group
Working Paper Series**

**New Business and Economic Models in
the Connected Digital Economy**

Irene CL Ng

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The group conducts research that is capable of solving real problems in practice (ie. how and what do do), while also understanding theoretical abstractions from research (ie. why) so that the knowledge results in high-level publications necessary for its transfer across sector and industry. This approach ensures that the knowledge we create is relevant, impactful and grounded in research.

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- Visualisation
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New Business and Economic Models in the Connected Digital Economy

Abstract

This paper discusses business models as a systemic phenomenon as opposed to traditional reductionistic approaches of business disciplines. It presents the ways connectivity change economic models due to the availability of consumption data as an economic resource, markets forming at consumption spaces, and how industries could disrupt one another when connected through consumption technologies. The paper further suggests that the challenges posed by connectivity results in the redrawing of traditional firm and market boundaries. It proposes for more research into modularity, transaction costs, the future role of the firm, and the necessary transformation of businesses to stay agile in a connected digital economy.

Keywords: *consumption, business models, economic models, markets, transformation, digital economy*

Introduction

For more than five centuries, the industrial era has operated on the basis of market exchanges as a means of allocating resources and distributing income. The input market, if efficient, provides those who have some resources (such as labour) to trade it for other resources (such as money) so that other goods can be purchased. Demand for goods at lower prices justifies the need for the firm, a consolidator of resources, including labour, but also justifies investing in technology and capital to produce such goods in exchange for money with some profit. All was thus well as long as the economy kept chugging along and trade was buoyant. Of course there were many who railed against how proceeds were distributed, the inefficiencies and imperfections of markets, the arbitragers, the corrupt and the degree of regulation but essentially, the exchange economy soldiered on and its health became the object of measurement, and a proxy for a country's economic well-being. Globalisation didn't change the nature of the game, merely the players, and with the different players came the political agendas. This state of affairs drove the research and knowledge generated by the academic disciplines of business, economics, manufacturing, engineering and computing, largely schooled in the role of each discipline and its contribution towards the logic of markets and the economy the way we know it. Business divided its studies into strategy, marketing, OBHRM, operations, finance and accounting to create better market advantage and sustainable profits and the applied sciences of manufacturing, engineering and computing wrestled with the challenge of applying good science (and often social science) into creating more efficient and effective offerings.

The last 30 years, however, have seen a subtle shift in the way the economy has been operating, much of it spurred by the Internet. The Internet started as a medium to reach out to unserved markets, with the message or product largely unchanged. For example, the Internet allowed banking and shopping to be done at home, while giving individuals access to information that was not easily accessible, such as archived newspapers or obscure information on dinosaurs and art. Gradually, the medium began to change the nature of the message. Music could become mash ups, e-magazines and e-books could embed Internet links and allowed for increase in font sizes. This 'digital backwash', as I call it, has also begun to affect physical products, with the smartphone as a clear example. The customer buys it as an 'incomplete' product and completes it by personalising it with apps and changing interfaces for different contexts of use, even changing its nature such as when it is used as a torchlight or camera. This creates the benefit of achieving full scalability and cost effectiveness for the firm through a standardised product, while allowing for deep personalisation of the product by the customer, defying the traditional manufacturing cost trade-off between customisation and scalability. As more products become connected to the Internet through the Internet-of-things, physical products are set to incorporate more of such pervasive digital technologies, not just through apps but with sensors and other ID technologies as well (Yoo, , Boland, Jr. and Lyytinen, 2012) . With the advent of additive layer manufacturing, i.e. 3-D printing, which could potentially be integrated with original manufactured objects, products will increasingly be capable of more dynamic reconfigurability well beyond the factory floor. Progressive manufacturing firms will be redesigning their products' physical and digital boundaries to create greater value both in its use and in its connectedness to other objects.

New Business Models

The potential connectivity of objects is fundamentally changing the firm's relationship with the market and its customers and the way revenues are being derived. It is no wonder then, that both the practice and academic communities have lately been discussing new business models. Depending on which discipline one speaks to, business models are defined differently and this paper will not go into such definitions in great detail (see Osterwalder, Pigneur and Tucci (2005) and Zott, Amit and Massa (2011) for a more thorough treatment of the topic). However, I shall offer a pragmatic discussion of the concept, consolidating both practice and academic streams and also offering a systemic approach that might be useful. Broadly, the business model consist of three components - *the value proposition* (that which the firm is responsible for) which could be a product or a service; the *value creation* which is the experience of the product or service by the customer; and *revenue/resource stream*, that which Osterwalder (2009) terms as value capture, which is the manner in which the firms derives benefit (monetary or otherwise). While a business model has three

components, it may be nested within another business model for a different customer community. For example, Google's value proposition to the individual is its search engine; the experience of the search (value creation) generates data of the individual which is the benefit Google gets as a resource stream, but that resource goes into Google's advertising value proposition for its business customers who create value by experiencing Google's business service online and give money in return for targeted advertising opportunities.

From my perspective, the business model has seen greater discussion of late because of its systemic nature and the linkages between the components. In the past when firms sold products, the linkages between the value proposition (the offering), the value creation (the experience) and the resource benefit (the money) have been rather loosely coupled, especially for physical products. If the firm sold a watch, the experience (value creation) of a watch was away from the firm within the customer space and the payment of the watch was at market spaces such as retailers and both components had less impact on how the watch was made. In a traditional product economy, value propositions, value creation and resource/revenue streams were therefore loosely coupled and from a systems perspective, each component could be analysed, improved upon or changed without much impact on the other. Consequently, even while their relationship is investigated in some domains such as supply chain and revenue management, the consumption, market and manufacturing spaces could often be studied separately and many academic disciplines and their research have progressed on this basis.

The connected digital economy is changing this. Beginning with the computer and moving quickly into smartphones, devices and other objects, the way value is created by the customer within their use contexts is changing the firm's relationship with the customer into one that is longer, more enduring and intricately linked to other firms. This then impacts upon the revenue/resource streams back to the firm, which in turn changes the way the firm is designing and configuring its products. In other words, the three components of the business model are becoming more tightly coupled and changing one component impacts on the other two.

I therefore argue that the frequent use of the term 'business model' is the semantic expression for both practitioners and academics to cope with the systemic phenomenon, differentiating it from the traditional reductionistic approaches in business where functions and academic disciplines, such as strategy, OBHRM, marketing and operations management, could get on with advising businesses from their silo-ed domains. From an academic standpoint, a new business model isn't just about product or service innovation (the value proposition), or the changing revenue/resource streams, such as money from ads or subscriptions of music instead of buying music (value capture), or the customer experience enabled through a digital

medium (value creation), but potentially all three, due to the tighter coupling of the components. A more tightly coupled business model requires a fundamental transformation of the firm in terms of the way it structures itself so as to continue to function in the economy. To understand why this might be the case, we return to the phenomenon of digital connectivity and new economic models.

New Economic Models and Personal Data as an Economic Resource

While a business model is about how the firm 'does business' as manifested within the systemic nature of value proposition, creation and capture, the economic model sits at the level of the economic or market system, and the allocation of rents (revenues, resources etc.) to the multiple entities participating in the system i.e. "who does what and who takes what" (cf. Jacobides, Knudsen, and Augier, 2006). The economic model sits within the industrial organisation branch of economics examining the structure of, and boundaries between, firms and markets (Besanko, 2012; Shy, 1996). Clearly how the firm participates in the economic system will impact on the way it does business, so it is logical to assume that business models are nested within economic models. Often, as in the case of Google, the business model is nested within several economic models.

The digital connectivity between objects and people isn't merely about changing the use or experience of such objects but also unleashing a new economic resource for both firms and individuals - that of consumption and experiential data. For the first time, consumption and experience of products is digitally 'visible' through use/experience data. Until now, sales and scanner data is often the only means through which firms can view and analyse buying behaviours to influence customer choices. Research in loyalty, CRM (customer relationship management) and more recently VRM (vendor relationship management) have developed metrics, methods and predictive tools to advise firms on demand management (Juttner, Christopher and Baker, 2007; Mollenkoapf, Frankel and Russo, 2011). The Internet-of-things movement is, therefore, a new frontier for the understanding of demand and customer choices, informed by actual consumption behaviours. For example, if firms understand consumption and experience of their products better, they could innovate and create more personalised products or delivery mechanisms such as when we might need milk or tailoring the week's groceries for more fibre in the customer's diet. Consumption data of both durable goods and consumables will impact on the way the firm shapes its value proposition and more progressive firms will want to dynamically configure it through the use of technology, for example allowing individuals to automatically exchange the use data collected in homes for an automated service through a platform. If the personal data is owned by the customer, there may be greater willingness to generate more of the data through the voluntary installation of sensors in the home. Such data becomes a precious commodity for the customer that

the firm would like to trade for as it is more accurate than big data predictions.

The availability of consumption data as an economic resource will clearly change the relationship between the customer and the firm, which could, in turn, change revenue and resource streams for firms. For example, content generated by customers can also be an input resource for the firm's value proposition. With the appropriate technology, a customer who pays for parking through a geo-located smartphone informs the firm which car park bay has been taken, an input resource that helps the firm provide a better service to other customers. For that resource, the firm may be willing to discount the car park fee. Crowdsourcing, as practitioners like to call it, brings into play the type (and quantity) of input demand resource in production economics for creating the firm's offering that interacts with the actual demand for the offering. Future revenue and pricing researchers will have to understand the marginal rate of technical substitution between personal data and monetary revenues. However, as the next section will highlight, the worth of personal data is dependent on the contexts through which the personal data could be useful.

New Economic Models and Future Markets

As Google has shown, data is potentially revenue. However, data can only be converted into revenues if it is a resource to be used in the right context, such as converting our search needs into targeted advertising opportunities. For example, by tracking myself, I could realise that I do not drink enough water in a day. This may create a behavioural change in myself but does not create economic worth unless it is commodified into when, how and where I buy water. In other words, personal data on product consumption may have some value to the individual but to create economic worth to the firm or to generate new products or services, it would need to be transformed into a resource for an appropriate economic or market context. In economics speak, the external benefits from personal data would need to be internalised into the economy as we know it for the creation of more business opportunities, employment and greater economic wealth.

Customer input as resource is not a new concept, especially in service research. Value is often understood as being co-created in experiential and consumption contexts, requiring customer resource to achieve outcomes, e.g. to know what time it is, the consumer has to look at the watch (Ng and Smith, 2012; Vargo and Lusch, 2004, 2008). What is new, however, is that the consumption data can now be separated from the person, allowing for its commodification into a resource for economic activity such as buying food, or planning future consumption. In addition, technology creates the ability for the firm to participate in consumption activities by proxy such as allowing for the product to be dynamically reconfigured based on changing contexts of use. Extending the earlier example, when an individual checks

the time, the watch could detect that it is lunch time and energy levels are low and then suggest places to have a bite based on the person's location. This dynamic participation for the firm may stimulate demand for the offering, or create additional economic benefits for the firm outside of its usual revenue streams. The digital visibility of customer experience of a product, available as personal data, is therefore potentially the firm's biggest opportunity to create market advantage through configurable products or service. To leverage on it, firms have to move beyond the current traditional mindset that consumption data is only useful as intelligence to feed back for demand management, similar to buying data. Consumption data is potentially much more than that, especially when the data is real time, and can allow for demand stimulation as well as dynamic and personalised response to serve customers in context and on demand. Music has evolved in such a manner. Where previously music resided in CDs to be purchased out of contexts of use (at shops), the digitisation of music has created a market in context of use and on demand. Wherever it is technologically possible, markets for products of the future will come to exist within consumption spaces for the simple logic that consumption spaces are where needs are fulfilled. The current 'distance' (in terms of time and space) between purchase and consumption is a market inefficiency that technology can quickly resolve, i.e. from an economics perspective, markets at consumption spaces, if technologically possible, is Pareto efficient. Customers are often more willing to buy closer to when they need an offering, and firms will derive greater revenues.

Finally, if individuals could see and understand how we consume the products we buy, behaviours could change, especially with regard to food, medicine, water and energy consumption, or even habits. Consolidating consumption data to present it back to individuals will spawn an industry of applications and services to serve individuals at home and on the move. Some of these applications may be integrated to the traditional products, e.g. your vacuum cleaner with an integrated app advising you of potential allergens in your home. The impact of more personal data will have a profound impact on the health and well-being industry especially when it is exchanged for personalised medicine and other health products.

New Economic Models and Disruption

Digital connectivity will also allow current vertical industries to 'wet-wire' their value propositions and revenue streams to other firms' offerings since individual consumption experiences often include other objects (the term 'wet-wire' is chosen as analogous to its urban usage which refers to neural tissue connecting with bionic implants). This could potentially result in disruption of revenue and resource streams. For example, since we often need a car to go the supermarket, it may not be too far-fetched for the supermarket to subsidise car insurance and fuel only for supermarket trips (which could be digitally visible, measurable and automated), resulting in

loss of revenues to fuel or insurance providers. The wet-wiring impact is potentially the most disruptive of all, as it could spawn innovative products and services that do not resemble the current offerings achieving the same outcomes. As Marc Giget puts it "No candle-maker has become a bulb manufacturer, no carriage-maker has become a car- producer, and the post office did not invent the email."¹ More recently, it did not occur to the world that the printing of photographs was an inefficient mode of storing and sharing memories until it was disrupted by digital technologies, with Kodak as a victim in the process. The age of vertical industries is coming to a close as greater digital connectivity at the consumption and experiential end will drive lateral intermediaries across very different industries (e.g. car, groceries and insurance), potentially changing market boundaries and their competitive dynamics.

Future Research Agenda

Since business models are embedded within economic models, it stands to reason that technological changes that disrupt economic models would disrupt business models as well. Given this orientation, studies of new business models in the connected digital economy would need to take a systems theoretic approach and address the issue of structure and governance of the firm and the transformation of its business so as to become more agile.

Much of what we know today has been driven by a make-to-sell economy of products and a sell-and-deliver economy of services. This has resulted in a reductionistic approach to knowledge and it is a challenge to even consider what questions to ask when some of the boundaries and structures that underpin our knowledge begin to change. Manufacturing processes often end at the factory floor but are now challenged by the business model of incomplete products with digital applications or 3D components in customer spaces; supply chains terminate at retail market spaces but are challenged by the need to deliver to consumption contexts on demand; revenues traditionally come from sales but are now challenged by the role of personal data and other revenues from consumption contexts. The firm's enduring relationship with its customers and markets, tightly coupled with revenue streams and the design and delivery of its offering will require some fundamental re-thinking, in terms of its organisational strategy and governance. With the redrawing of market boundaries, the issue of modularity and transaction costs becomes increasingly relevant (Araujo and Spring, 2010; Lampel and Mintzberg, 1996; Baldwin, 2008). Even in economics, there is the issue of what a 'unit' of exchange is, on which is the basis of much of neo-classical economic analysis. Finally, with greater connectivity, the creation of platforms and infrastructure (sunk costs), data,

¹ Pictet Search Perspectives, *In Conversation with Marc Giget*
<http://perspectives.pictet.com/2013/06/19/interview-with-prof-marc-giget/>

search and coordination costs fall to almost zero. Combine that with low information asymmetry, and we may even have to revisit the theory of the firm, why it exists, and its role in the connected digital economy.

Research communities globally have been wrestling with the challenges of connectivity. Within service research, many have begun to use Service Dominant logic (Vargo and Lusch, 2003, 2008) as a foundation to transcend some of the legacy knowledge. Within this S-D logic research community, the theoretical construct of business and economic models is a service system and the application of competency (the service) of entities within it for systemic outcomes (Maglio and Spohrer, 2013). In pushing the frontiers of this research, a network of researchers in new economic and business models (<http://nemode.net>) was formed under a £1.5m UK government initiative. The HAT project has also been launched (<http://hubofallthings.org>), which will attempt to create the first ever market platform in the home for the exchange of personal data for future personalised products and services. This £1.2m UK government funded project aspires to internalise privacy-preserving personal data back into the economy for more business opportunities and greater employment.

In the past, Internet companies were special cases in the economy. In the future, most companies will be Internet companies and traditional manufacturers that only make to sell will be the special cases. Yet, much more research is still needed to advance knowledge in the connected digital economy.

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