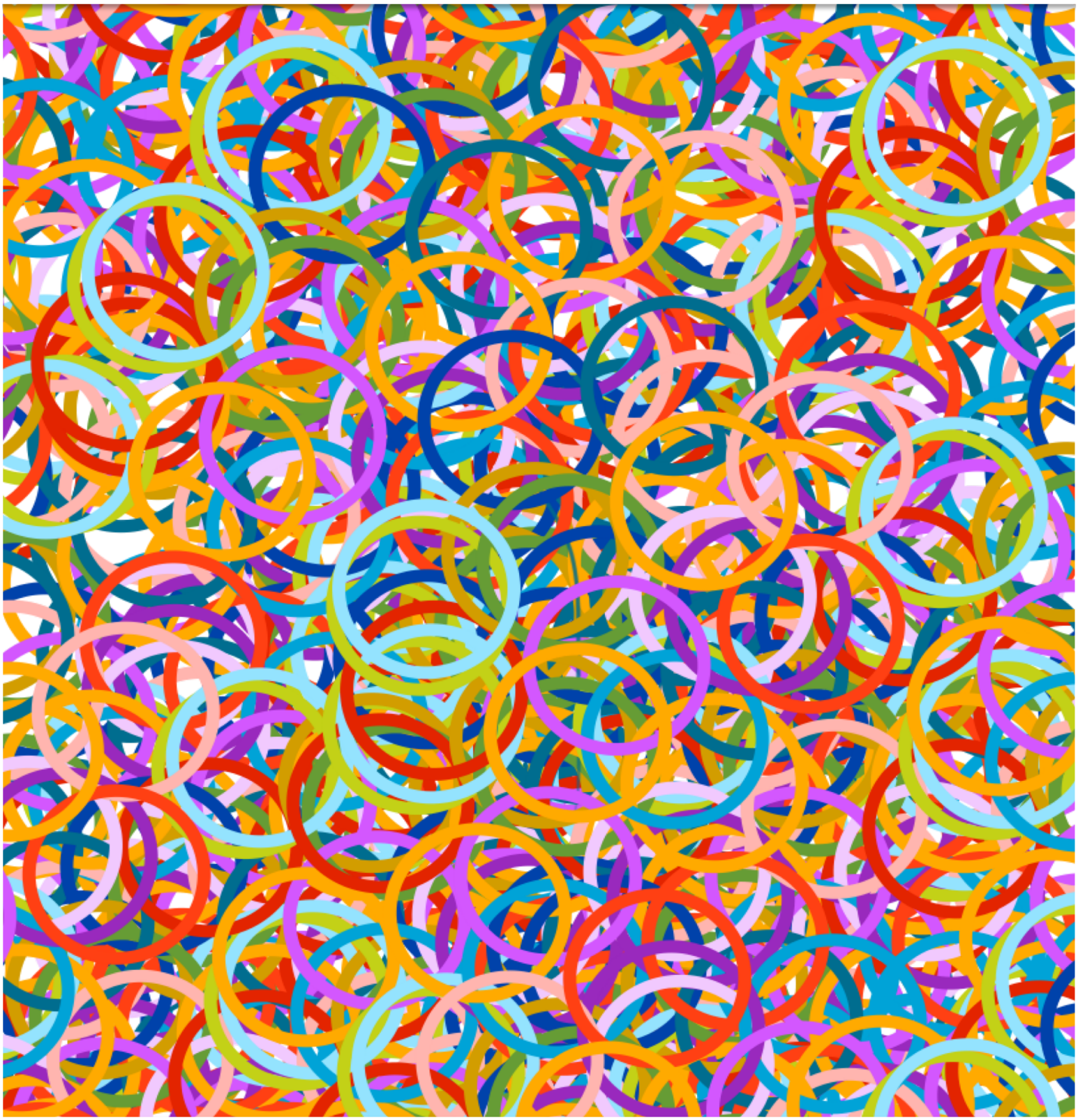
JIM
Journal of Innovation Management
The International Journal on Multidisciplinary Approaches on Innovation
Volume 6 Issue 1 | 2018 | open-jim.org



ISSN 2183-0606
FEUP Edições

Volume 6 - Issue 1

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ISSN 2183-0606
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Journal of Innovation Management
JIM 6, 1 (2018) 1-4
HANDLE: http://hdl.handle.net/10216/111571

Stay True, But Innovate!

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Editorial

Were you ever asked by a manager to 'do what you want', where you felt free to innovate? Did it feel like freedom? Maybe you felt encouraged since you could now experiment your idea, but did it mean that your performance was now on the radar? Could you then stay true to your vision or did you feel the need to compromise so that the 'numbers lined up'? Either way, you should know that you are not alone. Arguably, we are in an age of paradox[1] where simultaneous contradictions are all too common. Innovation paradox arises when "the aggressive pursuit of operational excellence and incremental innovation crowds out the possibility of creating groundbreaking innovations" (Davila & Epstein, 2014, p.2). Often these contradictions are meaningful on their own merit but when interdependent on each other, they create tensions in economic, social, environmental and ethical decision-making. In previous editorials, we have shared how digital innovations and societal disparity across the world are influencing strategic decision-making and shifting the innovation mindset. We now stretch the boundaries by suggesting that paradigms relying on economic trade-offs and shared-value that have shaped conventional organisational strategies are no longer sufficient to guide paradoxical tensions in decision-making.

The people, the planet and the organisations around us are changing at an increasing pace. While technology-driven innovations are proliferating across everyday interactions – from identity and financial services to shopping and even funeral services, the interdependencies between the old and new economies are getting blurred and confusing. Let us take for example Amazon,

[1]Handy, C.B., 1995. *The age of paradox.* Harvard Business Press, Boston, Massachusetts.

ISSN 2183-0606
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which is fast emerging as a global leader in retail but has its biggest investment in traditional supermarket chain Whole Foods. Yet another example is Tesla's innovative business model, which is outpacing other automobile manufacturers through vertical and horizontal integration into multiple markets. But the promise of low emission, environmentally-friendly Tesla electric cars relies on cobalt mining – a practice which in its current state would fail by utilitarian ethical traditions and may even make one with a Kantian view cringe for the social impact it is leaving behind in conflict-torn Republic of Congo[2]. The tough questions and accordingly topics of research in innovation now need to focus on managing these paradoxical tensions. Is it ethical to shift away from the old if new ways call for a compromise on current rationale? If there is a spoken or unspoken rule, what is the tipping point of this innovation ordinance?

No doubt, we are living in an era where various segments of the society are self-identifying themselves as global citizens, promoting equality, fairness and empowerment in the quest for converging progress. Yet, where innovations such as artificial intelligence, FinTech, blockchain technology and machine learning are enabling social change through inclusion, swathes of back-office, middle management and front-line jobs are at risk. Innovations continue to challenge conventionally presumed hierarchies and business models. For researchers and practitioners alike, engaging in these challenging and demanding conditions requires thinking divergently, yet intensely about the paradoxes in innovation – the knowledge sharing versus knowledge protection, local versus global, exploration versus exploitation and strategic stability versus opportunistic flexibility. This may mean employing methodologies that depart from the objective-subjective dichotomy to explore the real world from a pragmatic lens. One could begin with an argument than it would be prudent for a firm to focus on innovations that help reduce costs and maximise productivity, and then question why most firms do not employ a dedicated innovation office? How do innovative firms and people build, cope with and sustain collaborative innovations despite the challenges of intellectual property rights in collaborative business models? How can mindsets of value-acquisition be balanced with innovative thinking on value creation?

Evidence abounds of the companies that have successfully managed the innovation paradox. IBM and Apple for instance re-invented their product and value propositions after breaking through the status-quo. Nestlé's now multi-billion dollar start-up Nespresso revolutionalised the "coffee culture" by re-imagining coffee-by-the-pod. However, as companies like AltaVista and Research in Motion (the firm behind Blackberry) eventually discovered that while incremental innovation and concentrating on operational excellence to feed existing business models delivers gains in a stable environment, it quickly erodes market share in a disruptive and fast-paced technology enabled environment. For companies like AltaVista and RIM, the question was not about recognising technological shift, it was rather about how to cope with the innovation paradox. If the current structures and value propositions are delivering shareholder returns, when what is the right time to invest in experimentation of the unknown? While both these firms could boast about availability of infrastructure to match the change in patterns, they clearly failed to cross the "valley of death" – the often problematic shift from ideation to product development (Branscomb & Auerswald, 2001; Markham, Ward, Aiman-Smith & Kingon, 2010).

To overcome shortcoming in resources and capabilities in crossing the valley of death, most industries are increasingly adopting an open innovation model (Chesbrough, 2006; Spender, Corvello,

[2]See http://www.dailymail.co.uk/news/article-4764208/Child-miners-aged-four-living-hell-Earth.html

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& Rippa, 2017), leveraging the contributions of foresight and networks (Calof, Meissnerr, & Razheva, 2017). Yet, research on managing innovation paradoxes is lacking in combining the upstream and downstream value chains surrounding the focal firm's innovation ecosystem. It needs to be acknowledged through methodological shifts that innovation involves not only the focal firm but also its upstream providers, downstream beneficiaries and complementors (Hanaki & Owan, 2013). Such a focus would uncover the triggers and driving factors of innovation paradoxes, stretching current firm-level focus to individual-level decision-making tension on one hand, and managing social-interactions at the ecosystem-level on the other. One plausible perspective in this quest is O'Reilly and Tushman's (2013) organisational ambidexterity context. As organisations engage in more open and collaborative strategies, innovation paradox faces new tensions in exploitative and exploratory tasks, in terms of profits, intellectual property and sustainable development. Some real world case studies exist which capture the essence of how managers deal with tensions arising from innovation paradoxes (see Bingham, Furr, & Eisenhardt, 2014; Zeng, Hu, & Ouyang, 2017). Yet, research drawing on structural ambidextrous capabilities (see Dobón & Soriano, 2008), contextual ambidextrous capabilities (see Gibson & Birkinshaw, 2004) and coordinated ambidextrous capabilities (see Du, Pan, & Zuo, 2013) seems providential to advance the science and practice of innovation management.

In such a frame, while we reflect on the famous cases of Xerox[3] and Kodak[4] in understanding why some firms fails to innovate, Kalling (2007) point towards commonalities in organisational learning and knowledge creation as enablers of innovation whilst insufficient readiness, risk aversion mindset and ineffective team-working environment as factors which may stifle innovation. If resistance to innovation is rooted in paradoxes affecting active and passive engagement, then there great value for society in empirically testing and documenting structural, emotional and psychological conditions in which innovation fails, thrives or simply tires out. We can learn more about how to stay 'true' and yet innovate by choosing more pragmatically grounded methodologies, entrenching research into how individuals, firms and the ecosystems manage innovation paradoxes.

Anne-Laure Mention, João José Pinto Ferreira, Marko Torkkeli

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[3]See https://www.strategy-business.com/article/9854?gko=3a579
[4]See https://hbr.org/2016/07/kodaks-downfall-wasnt-about-technology

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Cite paper as: Mention, A., Pinto Ferreira, J.J., Torkkeli , M., (2018). Stay True, But Innovate! - Editorial, *Journal of Innovation Management*, www.open-jim.org, 6(1), 1-4. http://hdl.handle.net/10216/111571

Journal of Innovation Management
JIM 6, 1 (2018) 5-12
HANDLE: http://hdl.handle.net/10216/111571

At the intersection of ambition, realism and capability allows for strategy to be successful in a digital era

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Letter From Industry

Abstract. With an ever-changing market environment, converging industries are constantly trying to compete innovatively using commercial and scientific acumen to create advantage. Previously, successful strategy employed a set of robust steps which now need to change so that these firms can ensure their ability to be competitive. In this day and age, strategy now involves balancing a desired end goal, a recognition of the actual skills and having digital lens to overlay any and all recommendations. Using technology as an enabler, firms can ensure that its goals and its people are in the best possible position to deliver.

Keywords. Reinvention; Change; Transformation; Technology; Strategy.

Cite paper as: Rustomjee, Z., (2018). At the intersection of ambition, realism and capability allows for strategy to be successful in a digital era - Letter From Industry, *Journal of Innovation Management*, www.open-jim.org, 6(1), 5-12. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

Multinational corporations, governments, individuals and start-ups alike are now in a position where, to succeed, a revaluation of their current position is imperative to allow them to work towards incorporating a deeper aspect of digital into their business. To capitalise on the opportunities the new digital era brings, mitigating any impending social & financial risks, companies and teams need to change their behaviours to ensure they can adapt at speed. Where we are seeing this now is through the level of real-time connectivity which enables everyone to engage world leaders, policy makers, entire businesses, friends and family making access to those channels all the more important to influence.

"The last best experience that anyone has anywhere, becomes the minimum expectation for the experience they want everywhere"

Referring to any experience a customer would go through (commonly referred to as 'customer service'), the phrase, coined by Bridget van Kranlingen, the then, Senior Vice President of IBM's Global Business Services still rings true (Gowers, 2016). This phrase should always be present in the mind of every level of a legacy organisation or those trying to reengineer a new product or service from a café table, the question that keeps getting asked is:

2 How can we add value to our customers?

Although this question has always existed, as the ways that consumers and producers interact has evolved, so has consumer expectations. With changing social norms, in the palm of our hand is access to entire networks of friends and family, the ability to report on issues live and even to manage entire portfolios, giving everyone a level of control and influence, which was not previously there. This power of the consumer, where "the customer is always right" has again become reality for all industries whereby, word of mouth can now influence hundreds of people in an instant (IBM Business Analytics, 2013).

As such, companies are held to a new level of accountability whereby, their response time to issues and their overall responsibility are now very top of mind concerns which always need to be considered. Although companies recognise this need for continuous improvement, there still exists questions around the "what" and "how" but, many are failing to even adapt fast enough to avoid being consumed and forgotten during this disruption (Rishi, 2017).

3 The changing paradigm of Strategy

When we recollect how companies would traditionally address problems affecting their present and future position, working towards creating new 'strategy' would be the first step. These could take the form of a multi-year roadmap; sets of goals to ensure competitive advantage; quick win objectives for immediate cost reductions or; overhauling an operating model to promote talent & innovation. Although that list is far from comprehensive, it gives an idea into some of the outcomes of a strategic discussion where, regardless of which is chosen, the approach taken are all based on a structured methodology (Gavetti & Rivkin 2005). These steps allow for strategists

to make educated assumptions, document potential yet thorough outcomes and ultimately guide its recipients on the best possible path to success. Simply put, having a strong grasp of these steps can end month long boardroom debates in five minutes by having an attentive audience and a whiteboard.

This methodology can be broken down into four key steps:

1. External & Internal Diagnosis: used to understand the current environment, any industry-based trends or behaviours. This research also analyses the current capabilities of the organisation that needs to perform the change.

2. Defining, Hypothesising & Evaluating: all potential paths to success, considering those both realistic and ambitious. By modelling scenarios and balancing both risks & returns from pursuing each option.

3. Determining the best course of action: by bringing together all key decision makers, proposing each option and finally selecting how to proceed. Based on trusting that all reasonably available facts are presented a decision can be made by leadership on the direction of the firm.

4. Streamlining the Decisions: to ensure the organisation and its people know that they have the support by decision makers, have leaders near the staff who can motivate change and finally that the staff on the ground can operate at the required level to achieve it desired goal/s.

Until recently, this was how the most ambiguous and imminent strategic problems were solved successfully however, this structured approach will also need to evolve to keep up with the constant industrial changes driven by digital disruption (Berman and Dalzell-Payne, 2017).

In a world where cognitive, technology and innovation nomenclature are included in most strategic documentation, decision makers are realising they can no longer propose extremely ambitious strategies for their management teams to attempt to execute, hoping that if they even achieve 30% of the expected result, they will be successful (Malloy, 2016).

Successful strategies of today need to have a balance of the exciting end goals with a sensible and thorough delivery plan, achievable by those on the ground. Keeping this expectation of any strategy top of mind, having a view of the team's (internal & external) capability gives an added level of confidence, helping leaders work for their stakeholders to achieve the outcomes they expect. Strategies put together with this in mind intrinsically enable teams to work towards improving the customer (and the employee) experience whilst, ensuring the company itself can be competitive in the market and staying ahead of this changing industry.

4 At the intersection of Strategy and Implementation

Knowing that a strategy can actually be implemented seems like common sense however, the appeal of exceptional returns, explained by either in house teams or experts, tends to be more believable than not. As such, now where every decision needs to be defendable, there is additional

pressure to ensure that the correct people and behaviours are in place to deliver. Due to this pressure, firms have to revaluate their approach to strategy creation ensuring they manage their internal operations effectively in addition to delivering exceptional value to their customers. Adding a digital lens to the equation also means, these firms need to account for technologies that may not exist whilst knowing, that any negatively perceived behaviour by anyone, anywhere has the potential to cause a public catastrophe before the boss hears it internally.

It is therefore important to recognise that, plans need to work synergistically to ensure the two aspects (strategy and implementation) work hand in hand (Berman and Dalzell-Payne, 2017). Companies that have been successful in adapting and finding this balance have seen benefits through their journey for reinvention through a new level of agility by their management, flexibility to disruptive environments and finally, recognising that collaborative leadership that can inspire collaboration through these changes.

The role that this digital perspective plays in today's world is that, technology and its ability to benefit the customer is integral for a successful strategy to be created and implemented. Considering the above four stages of strategy development, a digital lens adds the application of analytics, better management of impending disruption and finally, allowing for technology to create transparency and scalability of solutions across the entire company.

As every industry is under pressure to adapt to this digital revolution, the companies that are unable or unwilling to enter the digital age will limit their opportunity for future success. The explosion of analytics has been extremely beneficial to those able to find valuable information and trends in the sea of data. Through finding value in data that the company gathers intrinsically, seeing trends and changing processed based on the outcome of certain decisions or processes, there are a multitude of ways that companies can better themselves through small changes. Looking externally, the benefit seen through monitoring social networks and the different fashions and openly shared feelings of customers adds another layer of feedback for well-defined improvement.

We recognise that even with a digital lens overseeing all strategic planning, what remains consistent is that, the ability to execute needs to be naturally embedded within that strategy. With the adoption of agile project methodology, design thinking and lean continuous improvement, prototyping and revaluating solutions allow for success within a short time period if utilised correctly. Strategists who can learn how to fail fast, adapt and then execute what works in the best possible way rather allow for real evidence to justify decisions as opposed to analysis and hypothesis determining the best course of action (Fuessler et al., 2018).

Regardless of the size of its impact, each strategy should ensure that the capability within the team and the persistence of the leadership clearly exist as, it is all three factors together that will ultimately determine the success (or failure) of any strategy, be it digital or not.

5 One industry at a time

In recent years the link between stratagem and implementation have been blurred for successful strategies where, what was once only a top down process directed by executive leadership teams who may be somewhat disconnected from those on the ground has now been flipped. Firms not only face competition from their historic industry rivals but also new firms who may be new to

ISSN 2183-0606
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the market with a single product or changing industries to try something new. What this new competition shows that, legacy brands and expertise hold less strength if a company is able to deliver a customer solution with a higher level of agility and dependability.

Therefore, to be successful in setting a strategy, firms have to ensure that the steps mentioned above around understanding, deciding and empowering are embedding throughout the entire company. As the industry changes constantly, then so must the strategy whereby, it becomes an iterative process through implementing and reviewing as soon as possible, making small adjustments till the objective is met.

The questions being asked by decision makers has shifted from a business, profit and cost question to that of, how we can disrupt or manage any new disruption; how we can capitalise on the readily available data or; how we can survive if we don't change fast enough. The apprehension felt by every industry can be seen below where industries are seeing changes including:

5.1 Transportation

What started as an attempt to create an amazing yet movie like network of taxis, has now become a world renown verb where, the start-up Uber was able to cause an avalanche of disruption to an industry once thought to be an unlikely source of innovation. With competitors from all over the world through Ola in India and BlaBlaCar in Europe personalised transport without owning a car has been changed forever and also opened the door to the customer again being at the centre of the experiential value chain. This has grown further to include all forms of road logistics disrupting long distance transportation of cargo where this accelerated digitisation and thus creation of very sophisticated systems of transportation have completed disrupted the sector (Dierkx et al., 2017).

5.2 Automotive

What was once just a necessary tool to get you from point A to point B, then turning into a symbol of status and identity is now having its entire existence and reason for ownership in question. With consumers having the power of mobility at their fingertips, this industry has seen many consumers are shifting from traditional models of vehicle ownership. Rather than fighting this new trend of ownership models, automotive manufacturers are using new technologies to disrupt the entire creation chain such as working with production staff enabling them with augmented reality-based tooling for them to see their creation before a single piece is cut or; to enable drivers to have access to a range of home-based controls from security and doors to enabling appliances and interior and exterior lights (James et al., 2017). By building new expertise around connectivity, mobility and analytics, reimagining both the customers and employees experience through the entire manufacturing and design supply chain becomes possible.

5.3 Healthcare

What was created with a focus on remediation has now shifted to one of prevention. As healthcare is something that affects everyone, the traditional models of having to wait countless hours for

ISSN 2183-0606
http://www.open-jim.org

results or going to various specialists to know what is wrong is being disrupted in the best possible way (Bowser et al., 2017). Recent innovations have been seen by hospitals, companies, governments and start-ups the like all with a focus on the customer (or in this case the patient) experience to achieve affordability, scalability and all with an individually tailored approach. Allowing the customer to manage and take control of their own health with wearables & IoT solutions enable consistent monitoring during everyday life rather than just sitting still for 15 min at a time.

6 Conclusion

Those who are responsible for developing the strategy of a given organisation are in a very different position today when compared with their predecessors. With the addition of new techniques that add value to project management and team collaboration, they have the added benefit of being able to fail fast and learn. That said, there is now an unprecedented level of public scrutiny whereby every decision may need to be defended.

Ultimately, strategy is no longer just a method of diagnosing a problem and submitting factually endorsed recommendations. It is now a creative way to directly lead a company towards continually deploying and scaling innovative ideas in an ever changing, customer centric world with a confidence in technology and the people using it.

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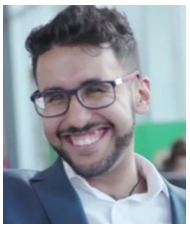
Biographies



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ISSN 2183-0606
http://www.open-jim.org

Journal of Innovation Management
JIM 6, 1 (2018) 13-31
HANDLE: http://hdl.handle.net/10216/111571
SM: Apr/2016 AM: Apr/2018

How Digital Life Changes our Personal Economy - A Market Analysis

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Abstract. "Digital life", intended as the consequence of being connected to any device, anytime, anywhere and the "sharing economy" phenomenon are impacting and changing both business and individual activities. Mass collaboration is emerging through multiple new tools for people and companies, generating a clear advantage in terms of effectiveness, creativeness and competitiveness. In this paper, we analyze how individuals are engaging the evolution of personal (peer) economics to identify the best cases of the most remarkable crowd-based start-ups. Moreover a new model is described on how big companies could leverage the crowd, with an open innovation approach.

Keywords. Digital Technology; Access Economy; Mass Collaboration; Sharing Economy.

Cite paper as: Zaffiro, G., Mourgis, I. (2018). How Digital Life Changes our Personal Economy - A Market Analysis, *Journal of Innovation Management*, www.open-jim.org, 6(1), 13-31. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

In 2013 researchers at NASA started wondering if there should be a better way to find life out of our planetary system: at that time, in fact, NASA employees were facing the problem of lack of time for such researches. As a solution, they decided to use the power of the crowd. They created a project called "Planet Hunters", open to everyone, to enable observations through the Kepler telescope. Remarkably, more than ten planets, suitable for life, have been discovered so far. This is an example how the power of crowdsourcing is one of the most effective tools that can be used to solve real problems and to create wealth. It brings better qualitative results and optimize processes, acting as a new collective human intelligence - not artificial at all.

This approach could be at the basis of the sharing economy (or collaborative consumption), which can be defined as a phenomenon that builds on a class of economic arrangements and technological ICT-related developments, which enables distribution, sharing and reuse among participants of excess capacity of products or services. As such, the sharing economy model goes beyond individual ownerships (Hamari et al., 2015). Like crowdsourcing, it is another direct consequence of Digital life.

Next sections elaborate how the sharing economy is emerging among individuals and how it could become a model for businesses by leveraging the crowd. Specifically, Section 2 provides an overview of the expected sharing economy market impacts. The drivers and barriers to crowdsourcing are reported in Section 3. Section 4 describes some examples of presently emerging activities, and a speculation on future ones is described in Section 5. Finally, Section 6 summarizes the main conclusions, recommendations and offers an outlook.

2 Market

The collaborative economy is considered as the third web-based innovation wave (Rick, 2013). Venture capitalists are showing great attention to this sector, investing a total of $172 billion over a 12 year span on several start-ups that are addressing peer-to-peer (P2P) marketplace solutions (Regner, 2014).

PwC claims that the emerging sharing economy is going to reach the same revenue value of the traditional competitive economic sectors (PriceWaterhouseCoopers, 2014), growing from 5% of market share in 2013 to 50% in 2025 and $335 billion in value.

According to (Deloitte, 2015), Facebook stimulates $227 billion of external value and 2.7 million jobs, through three broad effects: a) marketing tools, b) App environment, c) connectivity catalyst. These effects occur by third party operations in the Facebook ecosystem and exclude the operations of the company itself: the value of connected crowd is always higher that the market value, because of the side effects of interconnectivity (i.e., the so-called "network effect").

3 Drivers and Barriers to Crowdsourcing

As a new technological and societal trend, this phenomenon has not been consistently regulated yet, especially with reference to labor, local laws, taxation and intellectual property rights.

Nevertheless, strong technological and environmental driving forces are triggering it.

3.1 Political Drivers

Political decisions can be slow and have a negative impact on the sharing economy grow, nevertheless many local policy makers are acting to sustain it. For example, policy makers in Amsterdam, London, Paris, New York and San Francisco made agreements with AirBnB.com to provide a safer framework in short term house rental. These kinds of agreements for the sharing economy companies are not easy neither cheap. In fact, big money is spent for political activism and lobbying to protect the right of sharing. In 2014 Uber.com spent nearly $500.000 over a five-month period to lobby with state legislators in Sacramento and AirBnB spent $400,000 (Van den Dolder, 2014). The Washington Post looked at local lobbyist registration records and found that Uber hired at least 161 lobbyists in at least 50 USA cities and states over a 2 year time (Kosoff, 2014).

Modern consumer society is characterized by political apathy, in contrast to a healthy democracy that was always based on sharing (Parsons, 2014). As soon as citizens understand that the sharing economy has the potential to democratize the local wealth to all society, then also politicians will bring the change as an effect, despite the traditional sectors disruptions.

3.2 Economic Drivers

The main economic benefits for the rapid spread of the sharing economy are based on the most effective use of resources which increase the productivity, providing more profits to the owners (Fehrenbacher, 2010). Resources that were unused before, such as excess or idle inventory, can be now monetized.

Users have gained the alternative to pay per use or per task and to increase financial flexibility. Also, they have access over unique ownership or personalized experiences that they could not afford or get before, thus gaining extra value.

Usually there is no taxation on revenues as long there is no legal framework, causing negative effects on society and on business owners. Many efforts are going on on this issue. For example, in 2017 AirBnB has spontaneously introduced in its terms of service a paragraph on “taxes”, where it makes hosts responsible for any kind of taxes and where it declares its willing to facilitate direct collection and remittance of occupancy taxes in some jurisdictions (AirBnB, 2018).

3.3 Social Drivers

1) Trustworthiness

The trust in individuals in the digital age is declining, as a change of consumer’s behavior (Badger, 2015). Younger generations feel more and more difficult to trust through digital streams. Only 19% of millennials trust others, compared to 40% of baby boomers (Pew Research Center, 2014). Anyway, uncertainty has been tackled up to one point, adopting crossed verifications done by the users themselves and by interfacing to other networks. Also, the psychological and emotional

rewards of a successful interaction produce strong bonds and interpersonal trust (Parigi and Cook, 2015) and generates a virtuous circle.

The paradox of the American sharing economy is that the USA have the less willingness to share (Richter, 2014) and at the same time the higher adoption percentage of the sharing economy (Elks, 2014). In other words: "Uber, AirBnB and Kickstarter made Americans trust, share and help each other" (Tanz, 2014).

2) Employment

Digitization is disrupting all traditional jobs. Many strikes have been made against platforms like Uber and they are showing the problem created to the traditional employment market (Herbst, 2014). But the reality is that the sharing economy is replacing work with microworking and democratizing the spread of the sector's profits to the microworker crowd. Sharing economy workers can generally expect to earn a higher hourly wage through freelance assignments than through traditional channels (Sundararajan, 2016), even if this does not imply a higher annual income compared to the traditional equivalent. Uber drivers benefit significantly from real-time flexibility, earning more than twice the surplus they would in less flexible arrangements (Chen et al., 2017).

A massive adoption of the sharing economy can completely change the way we live and work (Howard, 2015). Some economists believe that we will overpass from traditional B2B (business-to-business) or B2C (business-to-consumer) models to an almost inclusive H2H (human-to-human) one; meaning that the crowd will finally offer the crowd as a solution in every possible sector.

3) Overpopulation

More than 8 billion people will be on earth by 2030 and most of them will be living in big cities (United Nations, 2015). In this scenario crowdsharing is necessary to ensure resources for more citizens. Also, the use of social networks and platforms generates a resurgence of residential communities.

3.4 Technological Drivers

The main technological drivers are basically P2P technologies that enable social connectedness – key factor for social profiles and reputations tracking - and the evolution of personal and mobile devices.

3.5 Environmental Drivers

Scientists warn that recycling is just not enough to tackle environmental problems, which should be faced holistically at their very core and not only looking at their effects. For such a reason, sharing has a great potential in the future (Childs, 2013), as it fights the problem proactively at the real core of consumption.

Potentially a sharing economy approach for cars could reduce 20% of the total USA energy related CO_2 emissions produced by personal vehicles. In big cities like Berlin or New York, respectively 46% and 56% of the population manage without their own vehicle, while the rest

of urban residents who still own vehicles don't use them very often - for example in Munich for just 45 minutes a day (Hüetlin, 2013). The University of California claimed that each shared car replaces 9 to 13 owned ones (Buczynski, 2011; Pick, 2012).

According to Fast Company, home sharing is 66% more effective than hotel accommodation (Scorpio, 2012). It is still early to measure a holistic environmental impact, because even though AirBnB travelers can travel cheaper, maybe they travel more (Schor, 2016). Moreover, even if more house capacity is used, still hotel construction keeps increasing (Gunther, 2014).

3.6 Legal Drivers

There are many legal pitfalls of crowdsourcing (Wolfson and Lease, 2011). Legal systems are changing slower than the spread of new technologies, such as crowdsourcing, producing many legal gaps. Local legal differences are making impossible to have a global legal policy for the sharing economy platforms. For these reasons, 72% of AirBnB users violated state zoning regulations according to New York State Attorney (Straifeld, 2014).

Most practices in the sharing economy are innovative and oscillate between the border of personal and commercial activities, therefore difficult to regulate them. Regulators should look at practices that are regarded as substitutes to similar commercial goods and services. At this level regulation should address compulsory contracts between parties, compensation, minimum skill requirements and liability (Ranchordas, 2015).

Besides local barriers, there are two more structural legal issues: employment and intellectual property rights.

Ultimately it is not clear if any crowd-worker would be classified as an employee under the Fair Labor Standards Act (FLSA) applied in the USA. This uncertainty, however, means that potential employers must be aware of the possibility of regulation (Gellman, 2015).

Companies face several intellectual property and confidentiality risks when conducting a crowd-sourced project (Lieberstein et al., 2012):

- submissions that contain infringing or unauthorized material;
- crowdsourced submitter lacks assets or resources to indemnify the company;
- increased contractual obligations and insurance coverage;
- consumer data in crowdsourcing projects can raise issues pertaining to the consumer's right of privacy.

A better evaluation of intellectual property risks should include determination of contributors, interactions with the company, crowdsourcing submissions confidentiality, requirements on proof of originality or general novelty and the expenditure to the crowd (Lieberstein and Tucker, 2012).

A strong intellectual property right protection encourages innovation, and, on the other hand, a weak one leads to innovations because it favors their diffusion (Blind, 2012). A good way to reach the two goals simultaneously may be to have in mind this ambivalence also in the crowdsourcing context.

3.7 Enablers

The enablers for the sharing economy can be categorized in 1) methods to create the service; 2) pricing and business model; 3) access types or the mechanisms to share the resources.

The methods reported in this section were identified by (Botsman and Rogers, 2010) and have been integrated with others that can be observed in the activities mentioned in Section 5, such as gamification and open innovation. Pricing models have been derived by observing the business models of the initiatives, as described in Section 4 and 5.

The alternative business models in Table 1 are common in the sharing economy and used by most of the companies. The use of one model does not exclude the others. Pricing in the sharing economy is much more innovative and creative than in the traditional markets.

Access is critical in the sharing economy platforms. In 2001 the futurist J. Rifkin described this phenomenon as "The Age of Access" (Rifkin, 2001). The World Economic Forum identified as types of access the following: renting, lending, subscribing, reselling, swapping and donating (World Economic Forum, 2013).

When designing a sharing economy service, some tools can be considered to develop a platform with a go-to-market philosophy and to handle trustworthiness. Solutions like Sharetribe.com, MyTurn.com and Near-Me.com can generate a complete sharing marketplace platform in minutes, using SaaS (Software as a Service) technologies, helping entrepreneurs to test in advance the market value and letting them pay as their ideas grow.

Table 1. The sharing economy methods and pricing / business models

Methods		
Name	**Description**	**Example**
Micro-tasking	a series of small tasks which together comprise a large unified project, done by many people over the Internet	TaskRabbit, MTurk
Crowdification	utilizing the crowd for every task (from new product definition, to development, to funding, to support and more)	BlaBlaCar, Kickstarter
Incentivation	the alignment of different user motivations, for instance giving a prize to best solutions in a contest	GoPillar
Open Innovation	use of both inflows and outflows of knowledge to improve internal innovation	AT&T TIP
Gamification	application of game-design elements and principles in non-game contexts	CellSlider.net

Pricing / Business Model		
Name	**Description**	**Example**
Pay per use	mainly for properties & experience	AirBnB
Auction mechanism	dynamic demand-supply matching	Lending Club, Uber

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Winner Contest	pay only for the best solution	GoPillar
Sharing of future profits	equity or skill sharing	MakeitApp.eu
Pre-pay per solution/ product	reward crowd-funding	Kickstarter

According to the Edelman Trust Barometer published annually (Edelman, 2018), trust in media outlets, businesses, government institutions, and non-governmental organizations (NGOs) has declined significantly in the past decade. Trustworthiness among users is key in the online world, and particularly to the sharing economy, as discussed in Section 3: solutions like Deemly.co were introduced to offer white-label mechanisms that manage and publish information about the user reputation.

3.8 The "digital life" shakes business and individual activities

The technological evolution towards digitization and widespread connectivity allows to simplify the access to resources and offers the tools for managing them. This is the key factor for enabling the sharing economy and crowdsourcing, as explained in the previous paragraphs. The methods with which to implement a sharing economy service leverage the "fractioning" of the resources – a fraction of work activity, a fraction of use of a product or a service – and are implemented through a digital platform, on which a reward model is then engaged; trust between the parties is essential to success.

The instantiation of a sharing economy service has consequences both for individuals, companies, and society. This fact calls for intervention policies to guarantee fair treatment for all parties and avoid creating gray areas. Regulations and laws should secure the rights of all actors, whether they are individuals, new businesses or traditional businesses that come into conflict with new ones.

The spread of the sharing economy makes the use of resources more efficient, which brings benefits in terms of environmental sustainability, although the democratization of access could, on the contrary, increase the negative externalities. The growth of the global population makes the sharing economy and mass collaboration instruments to overcome the difficulties of meeting their needs, just as the "fluidification" introduced in the world of work may bring advantages (increase in opportunities) and disadvantages (inequality). Finally, the introduction in the companies of open tools to increase innovation leads to issues of intellectual property that must be addressed.

Since sharing economy services are based on ICT access tools, the privacy and data protection aspects of their users should be carefully addressed by service providers. In the first half of 2018, two significant regulations are coming to force in Europe to address these topics: the Directive on payment services in the internal market (PSD2, 2015) and the General Data Protection Regulation (GDPR, 2016). These regulations will impact the sharing economy: PSD2 by catalyzing new third-party services, and GDPR by empowering consumers with more stringent consent requirements and more accountability and transparency in customer data use, building a more trustworthy experience.

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4 Presently Impacted Sectors

Today we are witnessing the success of the sharing economy in several market sectors, including: commerce, tourism, transportation, professional services, financial and education. The levels of success can be measured, for example, by observing the number of startups working in each sector, the value of venture capital fund received, the number of involved users and the social impact.

4.1 Commerce Sector

Amazon and eBay follow the P2P model as general marketplaces:

> *"When eBay started in 1995, it was not a slam dunk that people would send money across the country to nearly anonymous sellers, and these sellers would reciprocate by sending back items as advertised."* (Einav et al., 2015, p.9).

These kinds of transactions could never not work without a mechanism that enables trustworthiness.

Nowadays, there are online platforms where people can share almost any kind of personal product, like clothing (RentTheRunway.com), accessories (Stylelend.com), jewelry (Rocksbox.com), and professional equipment (Munirent.co). Digitization and 3D printing technologies are offering the crowd new ways to produce and share commercial products (Shapeways.com, Thingiverse.com).

4.2 Tourism Sector

In tourism AirBnB has become the most popular sharing economy platform for short-term accommodation. The Boston University estimated that the impact on hotel revenues was roughly 8-10% in urbanized areas such as Austin, Texas (Zervas et al., 2015). This caused a measured result of price reductions that potentially benefits all consumers.

Several entrepreneurs are trying to export the AirBnB model to smaller and more homogeneous markets: boat tourism (Boatbound.com), caravan tourism (Yescapa.fr), working office space (LiquidSpace.com, PivotDesk.com), event venues (EventUp.com), pet hotels (DogVacay.com, Rover.com), travel agencies (Evaneos.com, Vayable.com), tour guides (GetYourGuide.com).

4.3 Transportation Sector

Transportation has been crowdsourced in many ways. Carpooling consists of two methods:

- real-time ride sharing based on mobile devices – e.g.: Uber;
- on-demand ride sharing – e.g.: BlaBlaCar.

Car-sharing for short period rentals can be based on P2P technologies (e.g. Turo.com, Getaround.com, Drivy.com) or on city-based centralized systems (e.g. Zipcar.com, Car2Go.com), where the cars belong to the rental company and not to community of peers.

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Uber started in 2009 and received about $20 billion of funding so far. It operates in 53 countries and more than 600 cities worldwide, despite competition and many legal actions against it. Uber became the most popular and controversial sharing economy paradigm, giving birth to the term "uberization".

Another well-known example in this sector is BlaBlaCar, which connects drivers with empty seats to paying passengers and offsets distance travel costs. BlaBlaCar is not based on maximizing overall profits, but on creating economies of scale and being more environmental friendly. Despite this philosophy, BlaBlaCar is making the expansion in the USA harder than in the European market (Korosec, 2015), where it already operates in 17 countries. The pricing model starts as a freemium service and then switches to a freemium-premium model (which includes some insurance benefits) after reaching the country critical mass.

An established car maker like General Motors is looking at the sharing economy to innovate its business model: General Motors announced a pilot program of a car sharing service, called Maven. The car owners will use the Maven app to rent out their vehicles when they aren't using them (Welch, 2018).

Other impacted transportation sectors are: airplane sharing (Coavmi, Wingly), logistics (Postmates, Deliv.co, Glovo), park sharing (Sparky, JustPark.com, SpotHero, Luxe).

4.4 Professional Services

Professional services are offered by P2P platforms either as freelancing or micro-working general-purpose services or in specific sector marketplaces.

Best cases for freelance services are Elance.com, Freelancer.com, PeoplePerHour.com, Coworks.com.

The most representative cases for microwork services, which are providing simpler tasks compared to freelance ones, are Mechanical Turk by Amazon, TaskRabbit.com, Fiverr.com, SuperTasker.com, Thumbtack.com.

Professional services in specific fields count architecture (Arcbazar.com), interior design (GoPillar.com), design (99designs.com), animation (ArtCorgi.com), advertising (Zooppa.com), software development (Toptal.com), consultant analysis (Experfy.com), house cleaning (Helpling.com, Handy.com), house services Servicewhale.com), beauty (StyleSeat.com, Vaniday), journalism (Ebyline.com).

4.5 Financial Sector

Crowd-based solutions are impacting massively the financial sector, with the introduction of new type of services such as crowdfunding, crowd-banking, equity crowdfunding and other P2P financial services.

Crowdfunding platforms raised $2.7 billion and successfully funded more than 1 million campaigns only in 2012. According to Massolution, global crowdfunding volumes have raised more than 2-fold year-to-year to reach in 2015 a volume of $34.4 billion (Massolution, 2015). The top platforms are Kickstarter, Indiegogo, Crowdfunder, RocketHub and FundRazr. Globally the USA are the country with the highest participation, having funded over 6.000 projects so far

(The Crowd Datacenter, 2014).

Equity crowdfunding faced several legal problems, but some countries managed to remove most of the barriers allowing this sector to grow (Tordera, 2013). Some of the best platforms are AngelList, CircleUp, OurCrowd, Companisto, Crowdcube.

Crowd credit, loan and deposit marketplaces are using P2P technology to lower the cost of the traditional banking system. They allow their peers to invest in each other in a financially and socially beneficial way. Participants could be also small and medium-sized businesses. Loans usually have lower rates, flexible terms, no early repayment fees. Some examples include: Lending Club, Prosper, Funding Circle, Zopa, RateSetter, Upstart, Earnest, Auxmoney and LoanNow.

Other examples reside in the insurance sector with startups like Friendsurance that created the first P2P insurance network.

4.6 Education Sector

The social impact of the sharing economy in education is quite impressive. Only Duolingo.com, a freemium language-learning platform, has 18 million active monthly users (Amazon Web Services, 2016). Originally language courses were completely free, with no ads displayed as the content itself was completely made by the users and translated text of learners could be sold to customers like Wikipedia or CNN. In 2017 Duolingo decided to move to a new business model based on ads, certification tests, and in-app purchases (Ramirez, 2017). Didactic learning goals can be achieved rapidly thanks to friend's interaction, skill tree environment (with user progress) and data-driven approach to lesson planning. An average of 34 hours of Duolingo equates to a full university semester of language education (Vesselino and Greco, 2012).

Academic courses from high class universities are available from online platforms like EdX, Coursera.com, OpenLearning.com. Tutorials about specific topics could be found from Lynda.com, Udemy, Skillshare.com. Finally, classmates' notes can be found from CourseHero.com.

4.7 How "digital life" impacts our personal economy

Previous paragraphs described how an individual can benefit from being connected online via a personal device such as a computer or a smartphone: the purchase or rental of an asset can be done without physically moving, virtually extending the number of choices and empowering to access to the cheapest or fastest to get product or service.

The same advantages apply to hospitality: users can be immediately informed by the reviews of people who have already used the accommodation, and cut costs by dealing directly with those who offer hospitality.

The sharing economy has also considerably impacted the transport sector: the greatest advantages for the individual are in the ease with which you can find a vehicle, use it when you need it and where you need it, without having to own the vehicle or take time to sign a rental contract. Similar advantages are obtained when one may wish offering professional skills or, vice versa, finding someone who can help in a specific activity, or finance an idea without going to a financial institution (e.g., by reaching out to people who believe in that idea, and finally train in a subject

accessing from wherever it is convenient.

All these examples have in common the fact of making it simpler, easier, faster, often cheaper than before.

Businesses wishing to leverage the sharing economy, in case of lack or insufficiency of indications in the legal framework, should be prepared to take autonomous initiatives – such as AirBnB did with the management of the taxation of hospitality (see paragraph 3.2).

The application of the sharing economy is not limited to the field of business, but it intersects civil society in the broad sense. Therefore, intervention policies will be necessary to guarantee fairness of rights and opportunities for all the actors, whether they are the individuals who use the service, the new business actors or the traditional businesses that come into conflict with the new ones - for example, Uber versus taxi unions.

5 Future Impacted Sectors

In the coming years, as technology evolves, the sharing economy will have major impacts also in the energy, telecommunications and healthcare sectors, which are currently controlled by big corporations. Besides, innovation will be boosted by the crowd-based open innovation approach, progressively being adopted by large companies.

5.1 Energy Sector

The crowd is already involved in energy marketplaces, renewable energy financing and smart grids.

P2P energy sharing marketplaces empower people and corporations to share and donate energy to their friends, family or organization they care about. Early examples are: Gridmates.com, OpenUtility.com and Vandebron.nl.

Renewable energy financing is changing the way people generate and pay for their electricity and it supports local energy producers, having an impact on solar clean energy projects. The best example is joinMosaic.com.

Finally, smart grid providers like ParetoEnergy.com are offering a core smart grid infrastructure combined with software solutions. Battery energy storage systems, that are core to the smart grid infrastructure, could also be more economically sustainable when operated under a sharing scenario (Lombardi and Schwabe, 2017).

5.2 Telecommunication Sector

The “uberization” of the telecommunication sector is happening via over-the-top services and network virtualization.

Crowdsourced Wi-Fi Internet service providers allow Wi-Fi customers to share their connections with others in return for free access to other hotspots around the world. A globally successful example is Fon.com, running a hotspot network of 13 million nodes worldwide: each customer

shares some of its network service and in return receives free of charge what would otherwise be a paid-for service. Fon.com has partnered with several operators such as British Telecom, Vodafone, SFR France, SoftBank, KPN Netherlands, Deutsche Telekom, Telstra.

A reward mechanism of sharing data plan with strangers is what Karma, a 4G provider founded in New York city in 2012, promotes. Karma transforms hotspots into an open Wi-Fi network: when a new user joins the network of an owner of Karma, the latter gets 100 MByte of free data credited to her account. The company calls this model "social telecom". Other examples are NetZero, FreedomPop and Ting.

OpenGarden.com is the first "off-the-grid" messaging App, that works even without Internet connection or cellular phone coverage and already connects 3 million users worldwide. It uses a software-based mobile broadband network made of P2P connections between devices, while it leverages the density of them to create an OTT network. Another example was Endaga, a locally-owned, small-scale, independent cellular network run by and for rural communities, acquired by Facebook in 2015. Similarly, Rhizomatica runs a wireless mesh that allows smartphones to communicate, even in the case of catastrophic failure of cellular networks. These early examples can suggest a trend towards P2P mobile connections, especially for the digital divide affected communities.

5.3 Healthcare Sector

In 2011 Susannah Fox, associate director of the Pew Research Center's Internet Project, said that

> *"peer-to-peer healthcare is a way for people to do what they have always done – lend a hand, lend an ear, lend advice – but at Internet speed and at Internet scale"* (Fox, 2011, p.1).

Bio-medical research could improve by engaging the crowd to participate with simple and gamified tasks, like the MalariaSpot.org online app that uses a gamified process of diagnosing malaria by the crowd. Or CellSlider.net, a project set up in 2012 that shared images from tumors with the general public, enabling them to score tumor markers independently through an Internet-based interface, involving nearly 100,000 people (Candido dos Reis et al., 2015).

Hospital equipment can be shared: Cohealo.com provides an asset sharing mobilization and analytics platform for the healthcare industry equipment and Floow2.com offers a general B2B asset sharing which includes equipment, services and personnel.

5.4 Open Innovation Becomes Crowd-based

Open innovation, as opposite to internal R&D activities, is

> *the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively"* (Chesbrough, 2011, p.1).

There are many models to generate corporate value in an open innovation approach. Many companies are adopting a practice called product platforming, which is based on the use of open

APIs (Application Program Interface) or SDK (Software Development Kit) of other company products. Other methods are leveraging idea competitions, customer immersion, collaborative product design, innovation networks, joint labs with Universities and start-ups engagement.

Open innovation in the corporate context is based, like the sharing economy, on online cooperative platforms and "softwarization". The latter is transforming industrial systems from closed ones (hardware-centric) into open ones (software-managed). This trend creates the following benefits: first, easily sharing tasks among internal or external experts that are not physically co-present; second, creating a complex solution by integrating components that are developed in an ecosystem of partners.

The adoption of these models requires a company to strongly leverage on its innovation resources: the "crowds" inside and around the organization. It is common practice to include customers, employees or other industry and market partners, into several open innovation models (Stähler, 2010). An example of crowd involvement in innovation is the AT&T TIP initiative (AT&T, 2014).

5.5 How "digital life" will impact corporate economy

In the previous paragraphs how the digitization and the fact that software and computing capabilities can be found everywhere is acting as a disintermediation factor and distributing production capacities, once concentrated in a single actor, was described. In the energy context, local production will be able to enter the redistribution circle of energy; in the context of telecommunications, the "softwarization" will lower the technological barrier to offer/consume any digital services (e.g., from connectivity to processing, from storage to any sort of programmable application). The healthcare sector will take advantage of digitization, especially through the sharing of resources and exploiting data and crowd intelligence.

Finally, the entire innovation process will gain new energy from the "liquidity" introduced by digitalization and "softwarization", making it possible for an ecosystem of actors, either individuals or company partners, to contribute to open innovation projects, by engaging on a framework designed to integrate the best solutions.

The adoption of open innovation tools in companies must be supported by reasoning on the underlying intellectual property aspects (and risks), or vice versa those who participate in these models as contributors will have to verify if and which rules are followed. Appropriate terms and conditions could be used to balance and mitigate the risks associated with soliciting solutions from a crowd (De Beer et al., 2017).

6 Conclusions

The core mechanism of sharing economy relies on the "fluidification" of work activities and any access to products and/or services, implemented through a digital platform. This mechanism allows individuals and businesses to access new operational or creative resources, increasing opportunities to meet a need and the potential for business success.

The sharing economy offers companies numerous opportunities to adapt their business models to

capitalize on the trend of collaborative consumption. Companies have the potential to profit from the sharing economy by connecting people and helping to make sharing more efficient (Matzler et al., 2015).

In this scenario, companies need to look at the key resources and processes of their business model considering the "fluidification" of the resources and who provides the key resource, either the businesses or the customers themselves (Kathan et al., 2016).

After an initial expectation that the resource fluidification could disrupt several established socio-technical and economic structures,

> *"if the sharing economy continues along this current pathway of corporate co-option it is highly unlikely to drive a transition to sustainability".* (Martin, 2016, p.158-159).

The move of a big company such as General Motors, that has recently announced its intention to trial a service based on the Maven mobile App to enable car owners to rent their car when unused (Welch, 2018), is showing that the said pathway is not consolidated yet.

The sharing economy broad impact on individuals, companies, and society requests the introduction of policies to guarantee fair treatment for all parties and avoid inequality. Recently, in Europe, great attention has been put on privacy, personal data use, transparency and fair competition, by enforcing in 2018 the PSD2 and GDPR regulations mentioned in Section 3. These rules will help to increase the trustworthiness which is a key element for the success of the sharing economy. The creation of a sharing movement, suggested by (Schor, 2016), could be an instrument to revitalize and harness the less market oriented transformative power of the sharing economy for building social solidarity, democracy and sustainability.

In future, it is likely that the most successful companies will operate based on crowd solutions. After formulating new legal frameworks on sharing, our societies will follow massively this human-centric innovation approach, whose physical limits will be possibly overcome by the future combination of autonomous machines and human capabilities augmentation.

Acknowledgement. The contribution of Ioannis Mourgis to this work was carried out during his internship period in Telecom Italia S.p.A.

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ISSN 2183-0606
http://www.open-jim.org

Journal of Innovation Management
JIM 6, 1 (2018) 32-54
HANDLE: http://hdl.handle.net/10216/111571
SM: Jul/2017 AM: Apr/2018

Stuck in the Middle: Using Middle-Status Conformity to Unravel Conflicting Results in Innovation Diffusion Patterns

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Abstract. Studies of diffusion have found conflicting patterns of inter-organizational innovation adoption. This paper uses the concept of middle-status conformity to propose a model of diffusion that helps to make sense of these conflicting results. This model is developed by combining the status-competition model (Podolny, 1993) with the audience-candidate interface model (Zuckerman, 1999). The integration of these models yields two distinct diffusion patterns characterized by status differences in originating and adopting organizations. Additionally, five empirically testable propositions are developed in order to lay the groundwork for testing this hybrid model.

Keywords. Diffusion of innovations; Technological change; Social status; New technology.

Cite paper as: Earle, A., (2018). Stuck in the Middle: Using Middle-Status Conformity to Unravel Conflicting Results in Innovation Diffusion Patterns, *Journal of Innovation Management*, www.open-jim.org, 6(1), 32-54. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

Studies of innovation diffusion have often focused on whether the direction of diffusion is from low-status organizations to high-status organizations (Tripsas, 1997) or from high-status organizations to low-status organizations (Rowan, 1982; Strang and Soule, 1998; Greenwood and Suddaby, 2006). The former is consistent with high-status organizations having the most to lose from a change in the status quo, being overly focused on past successes, or rarely adopting innovations (Cooper and Schendel, 1976; Levinthal and March, 1981). In contrast, the latter pattern is consistent with the notion that the adoption of an innovation by high-status organizations provides that particular innovation a degree of legitimacy (Meyer and Rowan, 1977) and it is then adopted by lower status organizations through a process of isomorphism (DiMaggio and Powell, 1983). The labels for source and adopter groups tend to vary, for example, core and periphery (Strang and Soule, 1998) or leaders and laggards (O'Neill et al., 1998), but the essential structure of the debate remains: diffusion starts with one group and follows a roughly linear trajectory from less to more ubiquitous. The literature provides supporting evidence for both diffusion patterns, but struggles to theoretically assert which pattern we should expect in a particular case and why.

1.1 Motivation and Research Question

In an effort to resolve these conflicting empirical results and provide guidance to organizations trying to promote diffusion in the presence of strong status dynamics, this paper follows the advice of (Poole & Van de Ven, 1989) and (Abrahamson, 1991) to clarify the level of analysis and more carefully consider temporal dynamics when faced with an apparent paradox. Here, this clarification takes the form of reorienting the theoretical lens for examining diffusion patterns from adoption decisions at the organization level to view such decisions as embedded in the higher-level social structure of a status hierarchy (Ravlin and Thomas, 2005).

As a result, the purpose of this paper is to focus on middle-status organizations and the unique set of behaviors with which they have been associated (Marsh and Coleman, 1956; Menzel, 1960; Blau, 1964; Becker, 1970; Zuckerman, 1999; Phillips and Zuckerman, 2001). Specifically, the behavior of middle-status organizations is far more constrained by status dynamics than the behavior of other status groups. This explicit integration of middle-status organizations into models of diffusion creates an exhaustive status hierarchy (Phillips and Zuckerman, 2001) containing low-, middle-, and high-status groups, and leads to markedly different expected patterns of innovation diffusion than the two dominant patterns identified in the literature. Thus, the central research question addressed in this study is the following: what patterns of diffusion should we expect in the context of an *exhaustive* status hierarchy?

We answer this research question with a novel conceptual model that both helps clarify relationships between existing studies and proposes five testable propositions for future research. The central mechanisms in our model is a hybrid of Podolny's (1993) status-based model of competition and Zuckerman's (1999) audience-candidate interface model; we label this combined model the *status-audition model*[1]. The theoretical result of integrating an exhaustive status hierarchy

[1]We label the model developed in this paper the "status-audition model" because it integrates the assumptions

ISSN 2183-0606
http://www.open-jim.org

with the status-audition model is a three by three matrix of potential outcomes, where the three columns contain an innovation's status group origin and the three rows contain the same status groups as potential adopters. This model yields nine mathematically possible outcomes, however, only five of these outcomes are theoretically feasible in light of established dynamics of status group interactions. Furthermore, three of these outcomes – the diagonal of the matrix – simply state that organizations in the same status group can adopt innovations from one another, a result of little theoretical interest or practical importance.

This leaves two of the nine outcomes that both satisfy status constraints and represent inter-status group diffusion. The first feasible pattern is an innovation diffusing from high-status to middle-status organizations, but not to low-status organizations. The second feasible pattern is an innovation diffusing from low-status organizations to high-status organizations and then, only at a later time, to middle-status organizations. It is important to note that the status-audition model we develop in this paper predicts that high-to-low status and low-to-high status diffusion patterns (with middle-status organizations assumed to be the second adopter in both cases) will be unlikely to occur in the context of a strong status hierarchy.

1.2 Practical Implications

While our model contributes to a more nuanced and theoretically informed understanding of diffusions processes, it also provides practical guidance for those interested in promoting diffusion (e.g., policy makers, entrepreneurs with "viral" business models, etc.) For example, an entrepreneur's instinct might tell her to pitch a new idea to a middle-status organization with a value proposition of helping it catch up with leading organizations in a given field. However, since status dynamics tend to push middle-status organizations toward conformity (Phillips and Zuckerman, 2001), convincing such an organization to become an "early adopter" might prove especially difficult.

Similarly, organizations that rely on partners for diffusion, such as those in non-commercial settings including universities and national laboratories, may want to contemplate partner choice differently in light of our model. Specifically, licensing innovations to established industry partners has traditionally been the preferred mechanism for university technology transfer (Powers and McDougall, 2005), however, this may not be the most effective method to promote broad diffusion. Instead, our model predicts that licensing to relatively low-status organizations – such as startups or social ventures – would ultimately result in broader diffusion in a market characterized by strong-status dynamics. Of course, we do not contend that organizational status is the only force at play in the process of innovation diffusion; however, we do seek to build the case that it is likely more complex, dynamic, and non-linear (Abbott, 1988) than previously assumed.

To build the foundations for our model, we review selected portions of the literatures on diffusion patterns and organizational status. Then we develop the status-audition model itself. The development of this model suggests three propositions concerning diffusion patterns and two concerning the expected end state of innovation adoption once the theorized diffusion process

of loose linkages between an organization's status and its underlying product quality with the act of "auditioning" innovations for an audience consisting of high-status organizations in an effort to gain membership in the high-status group.

has completed multiple iterations. These five propositions complement and inform the existing literature on diffusion patterns and contribute to this literature by articulating a more complete and generalizable model of diffusion in the context of status hierarchies. This paper concludes by suggesting paths for future research, including outlining the ideal setting for an empirical test of the status-audition model.

2 Related Work

A review of the complete body of work on innovation diffusion and organizational status is outside of the scope of this study, but there are specific areas of these literatures that highlight the conflict this study seeks to address. First, we review literature on innovation diffusion patterns. It is important to note that the pattern itself, rather than the mechanism or channel of diffusion, is what we focus on in this study. The main goal of reviewing this portion of the literature is to demonstrate that low-to-high status (periphery to core) and high-to-low status (core to periphery) are common directional findings in studies of diffusion patterns. The secondary goal is to show that these status and positional concepts are closely related and sometimes used interchangeably by scholars; examples include studies by (Ibarra, 1993) and (Rowley, 1997). The second vein of literature we review is on organizational status with a particular focus on status-based competition and middle-status conformity. Combining insights from these literatures leads us to integrate middle-status conformity into status-based models of competition to form the core contribution of this paper.

2.1 Innovation and Diffusion

Diffusion is a highly generalized social process critical to social analysis (Strang and Meyer, 1993) that scholars have studied in many empirical settings. In the words of Strang and Meyer (1993, p. 487), "Virtually everything seems to diffuse: rumors, prescription practices, boiled drinking water, totems, hybrid corn, job classification systems, organizational structures, church attendance, national sovereignty." For the purpose of this study, we keep both diffusion and innovation at a fairly high level of abstraction. This is consistent with Rogers' definition of diffusion: when "an innovation is communicated through certain channels over time among the members of a social system." (1995, pg. 5) In this context, innovation is also defined abstractly as being synonymous with a practice and taking a wide variety of forms including structures, policies, attitudes, etc. (Strang and Meyer, 1993) While this level of abstraction may pose theoretical difficulties for certain research questions, it fits the central question of this study nicely in that it is not tied to a certain type of innovation, mechanism, channel, or setting.

This literature has investigated a number of fruitful aspects of diffusion including diffusion rates (Strang and Soule, 1998), patterns (Greve, 1996), mechanisms of transference (Burt, 1987; Ahuja, 2000), and adoption intensity (Abrahamson and Rosenkopf, 1993). Studies of status and diffusion tend to either examine the directionality within a status dyad (for example, Greenwood and Suddaby's (2006) use of the "big five" and "other" accounting firms) or remain agnostic to the role of status groups and simply assess overall adoption frequency as a measure of a particular innovation's status (Tolbert and Zucker, 1983).

ISSN 2183-0606
http://www.open-jim.org

With empirical evidence for both patterns of directionality, this topic risks being tossed on to the "both, and" scrap heap of seemingly un-resolvable paradoxes. Fortunately, a more nuanced treatment of organizational status and status hierarchies can help resolve the apparent contradictions of these studies by providing a theoretical foundation for why documented patterns of diffusion differ so radically.

2.2 Organizational Status

The fundamental goal of this study is to better integrate the insights from the literature on status hierarchies into the study of diffusion patterns. As a result, we limit our literature review to defining status hierarchies, reviewing Podolny's model of status based competition (Podolny. 1993), outlining findings on middle-status conformity, and describing (Zuckerman, 1999) candidate-audience interface model.

Research on organizational status and its competitive consequences is anchored in the institutional branch of organizational sociology with many studies (e.g., Meyer and Rowan, 1977; DiMaggio and Powell, 1983) in this area proving highly influential in the field of management as well (Suchman, 1995). As such, differences in organizational status and their associated dynamics may be as much a result of "myths and ceremonies" and concerns over perceived legitimacy as technological or economic efficacy (Meyer and Rowan, 1977). More specifically, organizational status is a specialized application of stratification theory, which theorizes a distinction between actors and actors' positions in a social structure (Podolny, 1993). In this study, the "actor" is an organization and the "social structure" of interest is a status hierarchy. (White, 1981) introduced the notion that organizations in a market context occupy socially constructed positions relative to other organizations engaged in similar productive activities. Since the level of analysis here is an industry, market, or other competing set of organizations, status hierarchy is the appropriate status construct to employ as opposed to "status" or "stratification" which apply to individuals or societies, respectively (Ravlin and Thomas, 2005).

(Ridgeway & Walker 1995) define status structures (including hierarchies) as "patterned inequalities of respect, deference, and influence among a group." The consequence of this definition is that status hierarchies are relational and exist only at the aggregate level (Ravlin and Thomas, 2005). Furthermore, status hierarchies can be thought of as an index measure of underlying competency where ordinal comparisons are far easier to make than cardinal ones. In a similar vein, status hierarchies have been described as summary mechanisms (Ravlin and Thomas, 2005) that are loosely linked to underlying quality (Podolny, 1993).

We frame the central argument in this study in terms of relative position within a status hierarchy. As result, we treat other positional terminology, such as *core* and *periphery*, as interchangeable with their status-based equivalents: high- and low- status positions. This is consistent with research that employs these terms interchangeably (Meyer and Rowan, 1977). The choice of status-based terminology over structural position-based terminology is essentially arbitrary, as recasting the status-audition models in terms of structural position terminology would not alter the predictions of the model.

2.3 Status-Based Competition

Perhaps the most precise enumeration of competition in the context of a status hierarchy is Podolny's "A Status Based Model of Market Competition" (Podolny, 1993). It examines how an organization's status position in a market affects its opportunities relative to its competitor organizations. Here, he defines status as "the perceived quality of that producer's products in relation to the perceived quality of that producer's competition" (p. 830). While status can be an end unto itself as observed by (Frank, 1985), Podolny argues that status' role as a signal of underlying and unobservable product quality is the central mechanism by which status hierarchies are created. This occurs in a situation when the quality of a good is impossible or expensive to assess in a meaningful way prior to a transaction, so the status of the producing organization is used as a proxy measure of quality. The result is that actual product quality and status are only loosely linked with tighter linkages foiled by time lags, the stochastic nature of the link, producer's relationships with others in the market, and difficultly of measurement (Podolny, 1993).

Considering status as an imperfect proxy for underlying quality and that organizations can be meaningfully ranked by this single dimension (including summary dimensions such as reputation, prestige, etc.), along with the assumption of bounded rationality (Simon, 1957), creates the theoretical conditions for the existence of status hierarchies. The status-based model of competition seeks to occupy a middle-ground between economics-oriented models that assume perfect linkages between actors and positions – in which status would be a meaningless concept – and sociological models which have been criticized as overly socialized (Granovetter, 1992). In other words, the former assumes perfect actor-position linkages, while the latter assumes no actor-position linkages whatsoever. This approach is consistent with Granovetter's (1992) warning regarding under- or over-socializing models of organizational phenomena.

Empirical evidence in support of the status-based model of competition is offered by (Podolny, 1993) in the setting of investment banking. Here he demonstrates that after controlling for such relevant variables as volume of transactions, position in the status hierarchy still maintains a large and significant effect on investment banks' bidding abilities. Furthermore, he demonstrates that even large changes in instrumental measures such as deal volume "do not overwhelm even small differences in the status order" (p. 863). Other studies have found similar effects in a diverse range of industries including law and financial analysis (Phillips and Zuckerman, 2001).

2.4 Middle-Status Organizations

The notion that conformity is lower as an organization moves in either direction on a status continuum from the midpoint is not a new concept (Marsh and Coleman, 1956; Menzel, 1960, Blau, 1964; Becker, 1970; Zuckerman, 1999; Philips and Zuckerman, 2001). However, researchers have not integrated it with the study of status-based competition or diffusion. The classic presentation of this phenomenon is an inverted "U" shape with conformity on the vertical axis and status on the horizontal axis. The interpretation of this shape offered by Phillips and Zuckerman (2001) is that high-status actors, sufficiently secure in the hierarchy, can deviate from conventional behavior (i.e., innovate) without risking their position. Furthermore, low-status actors are excluded from the benefits of the hierarchy, a priori, and so are also free to be

deviant since their chance of ascension in the hierarchy is essentially zero. The case of middle-status actors is peculiar in that they "have membership in a group, but feel insecure in that membership" (Dittes and Kelley, 1956).

At first, the notion of three distinct status groups may seem no less arbitrary than two status groups (i.e., "low" and "high"); however, the use of three status groups is not an arbitrary division. Rather, they stem from the three possible positions an actor can have relative to a boundary: one side, straddling, or the other side (Phillips and Zuckerman, 2001). In a status hierarchy, an actor is in one of three positions: unquestionably legitimate (high-status), unquestionably illegitimate (low-status), or as a candidate for legitimacy (middle-status). While the first two groups are largely free from pressure to conform, the third group is under careful scrutiny by higher-status actors and relevant external audiences (Phillips and Zuckerman, 2001). These three categories of groups therefore form an *exhaustive* status hierarchy, which is necessary for understanding diffusion patterns in their entirety.

Empirical studies of the inverted "U" pattern of status and conformity in terms of innovation diffusion have yielded a mixed result with Phillips and Zuckerman (2001) pointing to studies that both find evidence for this pattern (Marsh and Coleman, 1956; Blau, 1960; Menzel, 1960; Becker, 1970) and studies that do not find support for it (Cancian, 1967; Gartell, 1977). These conflicting results were never resolved and the relevant research traditions moved on to study other phenomena (Phillips and Zuckerman, 2001).

2.5 Candidate-Audience Interface

In the model we develop in this paper, the counterpart to the status-competition model introduced above is the candidate-audience interface model developed by Zuckerman (1999). The basic premise of this model includes an audience that first ranks "candidates." This rank interacts with the candidate's actual performance to determine the audience's evaluation of the candidate. For the purposes of this study, the audience is composed of high-status organizations and possibly consequential outside entities such as regulators, media outlets, funding sources, rating agencies, etc.

An example of a candidate-audience interface would be the application process for Ph.D. programs. Here the candidate for admission must present the audience (consisting of the graduate school and the admissions committee) with a case for their admission consisting of numerous elements, some with tight linkages between quality and status such as test scores, and others with looser linkages such as grade point average from a particular institution. Some applicants may be accepted or rejected automatically based their educational history (including status elements), regardless of the how well their case is presented (for example, the quality of written admission essays). It would be the marginally "admitable" (i.e., middle-status) candidate who would fall under the greatest pressure to conform to the audience's expectations. The audience's ultimate evaluation is driven partly by status and partly by presentation quality. This makes the candidate-audience interface model complementary to the lose linkages central to the status-based model of competition introduced earlier.

Phillips and Zuckerman (2001) tested this model which provided strong evidence for middle-status conformity in the context of status hierarchies using the organization as the unit of analysis.

Specifically, they tested it with both Silicon Valley law firms' propensity to adopt family law practices (a low-status innovation) and analysts' propensity to issue "sell" recommendation – an action that would undoubtedly anger audience members. In both cases the researchers observed a clearly defined inverted "U" pattern, a finding consistent with theory on middle-status conformity.

3 The Status-Audition Model

This literature review illustrates the need for a model of innovation diffusion in the context of status hierarchies that both theoretically integrates middle-status conformity, and helps to unravel the seemingly contradictory diffusion patterns observed in previous studies. The status-audition model we develop here draws on both the status-based competition model developed by (Podolny, 1993) and the candidate-audience interface model developed by Zuckerman (1999). The major difference in our model is that organizations are not auditioning to move up the status hierarchy per se, but are auditioning innovations to be viewed as legitimate by higher-status organizations as well as internal and external stakeholders (collectively referred to as the "audience") (Freeman, 2010). While this distinction is subtle, it allows innovations to diffuse rapidly in a stable status hierarchy, rather than requiring a reordering of the status hierarchy itself. This is important because status hierarchies have been shown to be remarkably stable over time (Podolny, 1993; Stewart, 2005), so a viable model must offer a mechanism for innovation diffusion that does not rely on the constant reordering of the status hierarchy to drive the process.

The status-audition model treats diffusion as a function of the status group origin of an innovation as well as the status of past adopters (we label this an innovation's "provenance") and time. This implies three distinct paths of diffusion, one each for innovations originating in low-, middle-, and high-status group organizations with the status of an innovation's adopter being revaluated at the end of each time period. These patterns differ radically because the status-audition model process places differing demands on organizations in each status group. In other words, organizations in a given status group are limited in which other status groups they can adopt innovations from and still be seen as legitimate status group members by the relevant audience. It is this status-constrained process of adoption, under the watchful eye of the audience, that produces the proposed patterns of diffusion.

Figure 1 shows the generalized status-audition model, however, it is important to note that the options available to organizations will vary at each step based on their position in the status hierarchy. The first step is consistent with the status-competition model (Podolny, 1993) in which organizations are aware of innovations originating in, and adopted by, other members of status groups. In the second step, the innovation's provenance is established and then considered in light of the audiences' expected reaction. The third step is consistent with the candidate-audience interface model as an organization weighs the cost and benefits of auditioning the innovation for the audience.

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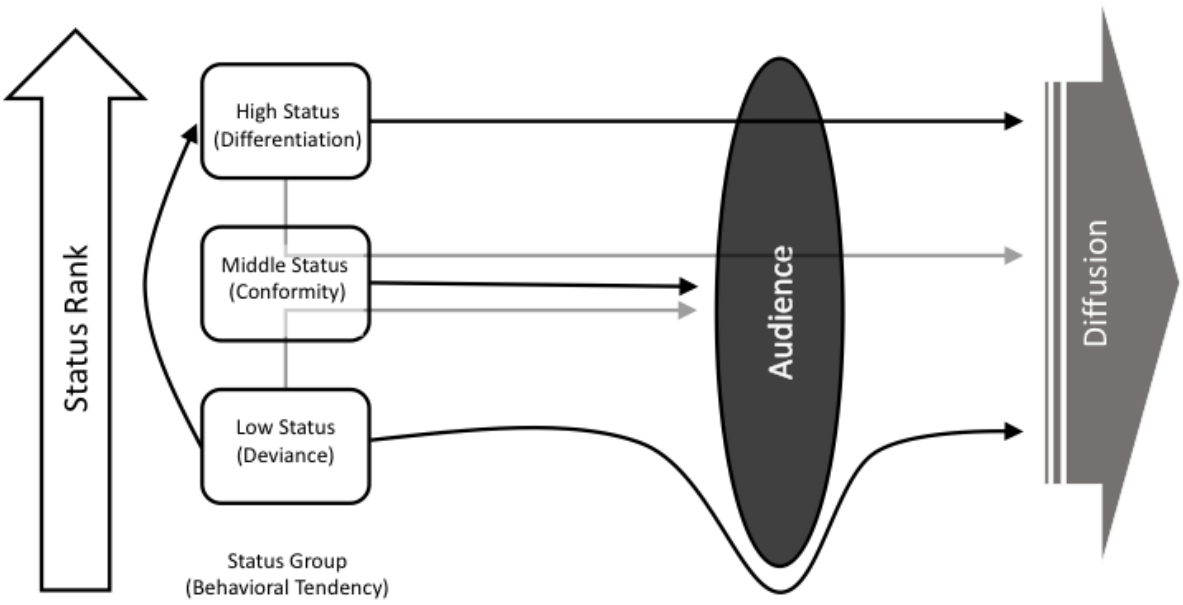

Fig. 1. Status-Audition Model (Partially Based on Phillips and Zuckerman's Candidate-Audience Interface model (2001))

The status-audition model is not primarily concerned with the actual reason for adoption of an innovation as this issue has been thoroughly investigated and convincingly shown to be a blend of instrumental and symbolic reasons with the relative proportion tending to move from more instrumental to more symbolic over time (Tolbert and Zucker, 1983; Westphal and Zajack, 1994). Instead, our goal is to explain the likelihood of inter-organizational adoption of innovations when these organizations are asymmetric in status. This goal implies some logical boundary conditions for the predictions of this model to focus in on what it tries to explain and what it does not. First, its predictions will be most likely observed in highly institutionalized settings where status matters a great deal in decision making (e.g., universities) (Burris, 2004). Second, since the innovation adoption process is complex, with status being one of many factors considered in adoption decisions, all propositions should be considered as if all other factors are equal. Third, we assume innovations in this context are observable by potential adopter organizations (i.e., not cases of "concealed adoption") (Terlaak and Gong, 2008), and have the potential to be adopted in the sense that some portion of the innovation can be mimicked by the adopting organization.

This model is constant with studies on environmental scanning where organizations are consistently looking for innovations (Miller and Friesen, 1982; Van de Ven, 1986; Khan and Manopichetwattana, 1989), regardless of whether they are symbolic or instrumental in value. This implies that organizations devoting at least some resources, formally or informally, to searching for useful innovations will be at least partially aware of the innovations adopted by organizations in other status groups. The status-audition model does not rely on the assumptions that organizations can perfectly assess all innovations adopted by other organizations or determine the future value

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of a given innovation cost free; instead, it merely requires an imperfect knowledge of innovation adoption by organizations in other status groups. Furthermore, this model is only concerned with when an innovation is actually adopted by a given organization, implying that the "boundedly" rational (Simon, 1957) managers of that organization must have believed that such an adoption would prove beneficial to the organization.

With the assumptions and boundary conditions of the status-audition model clearly stated, it is now important to be explicit in regard to its mechanisms and directionality. The innovation adoption process begins when an organization scans its environment – which mostly consists of other organizations (Hannan and Freeman, 1977) – in an effort to identify useful innovations. The organization limits its scanning process to status groups that can produce innovations that the relevant audience views as legitimate in order to protect – and potentially improve – its position in the status hierarchy. At the heart of this model is the notion that the provenance of an innovation matters according to which status groups will choose to adopt it.

3.1 Status and Diffusion

In terms of the status-audition model, low-status organizations are those that the audience does not consider to be serious candidates for hierarchy ascension. As a result, those organizations have a strong incentive to refrain from participating in status auditions. This is because conformity, in the form of adopting innovations prevalent in middle- or high-status organizations, is not enough to change low-status organizations' positions in the status hierarchy. In other words, the audience dismisses low-status organizations *a priori* so the audition of an innovation would tend not to occur. As a result, we predict low-status organization will either develop innovations internally or adopt innovations from other low-status organizations.

> *Proposition 1. In the context of a status hierarchy, low-status organizations tend not to adopt inter-status group innovations.*

The status-audition model makes the prediction that a high-to-low status diffusion pattern would be unlikely to occur within the boundaries outlined in this paper. While this is a bold claim, such a mirage can be generated by either utilizing an incomplete status hierarchy for source data – therefore mistaking middle-status organizations for low-status organizations – or by combining middle- and low-status organizations into a single group in which the characteristics of the former dominate. In the first case, the lack of a true low-status group (i.e., a true periphery) creates what would appear to be diffusion across the entire status hierarchy, but in fact would be showing a truncated diffusion process. In the second case, mixing of middle-status and low-status groups yields a top to bottom diffusion pattern in a status hierarchy, but this is simply due to the influence of the middle-status cases (as opposed to the low-status cases) in a data set partitioned into high-status group organizations and "others." Combining middle- and low-status group organizations would be acceptable only if low-status organizations were simply more extreme cases of middle-status organizations, a fact not supported by research in this area (e.g., Phillips and Zuckerman, 2001). Figures 2a and 2b provide a graphical representation of each scenario.

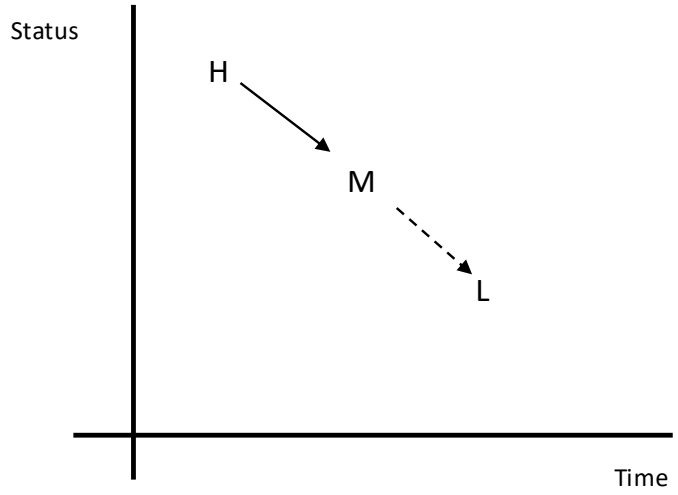

Fig. 2a. Diffusion in an Incomplete Status Hierarchy

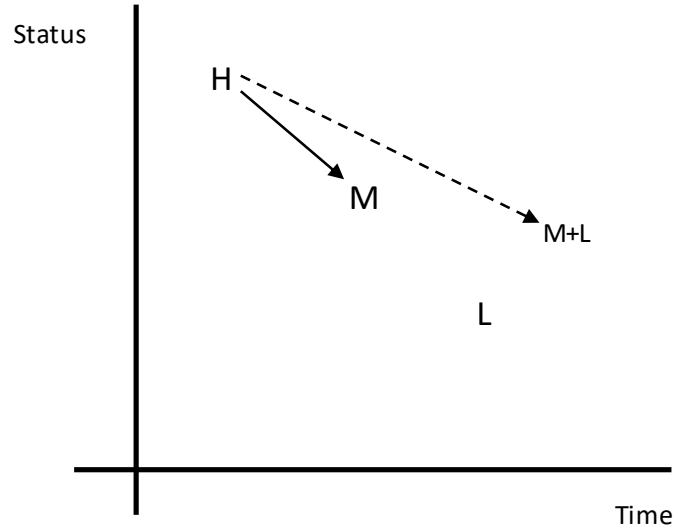

Fig. 2b. Diffusion in a Compound Status Hierarchy

Middle-status organizations are central to the status-audition model, as they tend to adopt innovations with high-status provenance in order to secure their place in the status hierarchy. Such an arrangement lessens the chance of diffusion from low-status organizations to middle-status organizations. This leaves only one potential inter-status group source for innovations for middle-status organizations: high status organizations. This is classic middle-status conformity in an organizational setting:

> *Proposition 2. In the context of a status hierarchy, middle-status organizations tend to adopt inter-status group innovations of high-status provenance.*

It is important to note that middle-status organizations' attempts to ascend the status hierarchy are consistent with status hierarchies being predominantly stable. First, the adoption of any single innovation is unlikely to fundamentally alter the status of an organization simply because organizations are complex (Simon, 1973). The accretion of successful innovations over extended periods of time may influence positions in the status hierarchy, but this tends to be a long process that would not result in dramatic shifts in status group membership over short-time horizons (Podolny, 1993).

Second, the adoption of high-status innovations by middle-status organizations is based on the expectation that it will improve an organization's status and permit ascension of the status hierarchy. Whether or not this actually occurs is immaterial since each innovation is largely unique and its adoption's impact on organizational performance is difficult, if not impossible, to determine with any degree of certainty a priori (Orlikowski, 1996).

The theoretical ramifications of these challenges to mobility reinforce the status hierarchy because middle-status organizations tend to adopt innovations that have already been adopted by high-status organizations, thereby foiling attempts to move up the status hierarchy with the adoption of an especially effective "disruptive" type of innovation. Therefore, an implication of a strong-status hierarchy is that the auditioning process essentially becomes a trap for middle-status organizations. By the time they become aware of the adoption of an innovation by high-status group organizations and attempt to adopt it themselves, the innovation is – by definition – no longer rare or inimitable and therefore problematic as a source of competitive advantage (Barney, 1991; Denrell, 2005). This result also holds for innovations that are symbolic in nature as long as being innovative is a distinguishing feature of the high-status group because mimicry does not in itself produce performance (Levinthal and March, 1981).

In the status-audition model, high-status group organizations are truly legitimate in the Meyer and Rowan (1977) sense, in that what innovations they choose to adopt go unquestioned. Theoretically, this legitimacy gives high-status group organizations carte blanche over all three status groups as sources for innovations to adopt; however, since middle-status organizations are essentially filled with innovations that originated in the high-status group to begin with, the only viable inter-status group source for novel innovations is the low-status group.

> *Proposition 3. In the context of a status hierarchy, high-status group organizations tend to adopt inter-status group innovations of low-status provenance.*

The three propositions generated from the status-audition model provide theoretical support for stability in status hierarchies. Low-status organization are free to innovate but are disregarded as serious candidates for the ascension of the status hierarchy. Middle-status organization must adopt innovations already utilized by high-status group organizations or they risk audience disapproval and imperil their position in the hierarchy. High-status organizations are free to innovate and will be mimicked by middle-status group organizations regardless of the provenance of the innovation they choose to adopt. While this model predicts stability in status hierarchies, it does not argue that status hierarchies are stagnant.

Movement can occur over time as certain organizations either fail or excel at their respective roles in their respective status groups (Podolny, 1993). For example, if a high-status organization

continually adopts innovations that turn out to have little or no instrumental or symbolic value, or adopts too many innovations from low-status organizations, its status position may begin to erode. On the other end of the spectrum, if a low-status organization is repeatedly the source of valuable innovations for high-status organizations, it may become a more carefully considered candidate for promotion in the status hierarchy.

3.2 Status Groups and Diffusion Over Time

In considering the status-audition model over time, we focus on a situation where the legitimacy of an innovation (from the perspective of the relevant audience) is the driving force in its adoption. We use this extreme case to foreground the role of status hierarchies in diffusion. However, in accordance with much of the institutional-focused research on organizations, we acknowledge that such decisions are complex and often include a mix of institutional pressures and effectiveness-based considerations (Westphal et al., 1997). As a result, the diffusion matrices we develop in figures 3a and 3b can be interpreted as "all else equal" when institutional pressures (in the form of status dynamics) are the dominant consideration in a given adoption decision.

If the provenance of an innovation was perfectly linked to its efficacy (pure efficiency), the status-audition model implies nine options for diffusion (as an innovation could move from one status group to any of the others based on perfectly unbiased assessment of its costs and benefits.) On the other end of the spectrum, if there were no linkage between an innovation's efficacy and provenance (pure status), diffusion would take place only from the top of the hierarchy to the bottom. However, in the in-between case where efficacy and provenance both matter (as we assume in the status-audition model), the number of possible diffusion patterns lies between the two extremes.

Starting with the nine-cell matrix and winnowing down the options using the status-audition model eliminates cells C, D, F, and H. We climate cells C and F because low-status group organizations do not benefit from auditioning their innovations for higher-status group audiences. We eliminate D because innovations in middle-status organizations have high-status group origins (from previous iterations of diffusion). Furthermore, we eliminate H because the adoption of an innovation of low-status provenance would endanger the position of a middle-status organization when auditioned for a high-status group audience.

Cells A, E, and I are perfectly valid diffusion patterns, but are of little theoretical interest here because they simply show that innovations can diffuse within status groups in the context of a status hierarchy. Such intra-status group diffusion may very well be how the majority of diffusion takes place, but theorizing and discussing such dynamics are outside of the scope of this paper.

This leaves cells B and G as the diffusion patterns of primary interest. The cell B pattern is for an innovation to diffuse from high-status group organizations to middle-status group organizations. Initially this appears to be a classic story of core-to-periphery diffusion as an innovation works its ways down the hierarchy. However, the innovation will tend not be adopted by low-status organizations since, despite the provenance of the innovation, the organization's status will prevent it from being successful in status auditions regardless of the efficacy of the innovation. In other words, low-status organizations will refuse to enter a contest they cannot win no matter the quality of the innovation they audition. This blunts the diffusion process at the middle-status

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group, so innovations generated in the high-status group would not reach the low-status group.

It is also important to note that the adoption of an innovation with high-status provenance does not mean that a middle-status organization will ascend the status hierarchy. This is because by the time an innovation becomes visible in the high-status group and is mimicked (which is an imperfect process in itself) by a middle-status organization, the innovation will no longer be novel and therefore not a potential source of competitive advantage.

The cell G pattern of inter-status group diffusion represents an innovation originating in the low-status group. Here the classic periphery-to-core pattern is not feasible because middle-status organizations would not gain from auditioning an innovation of low-status provenance for a high-status audience, as the innovation's provenance would risk the middle-status organization's position in the status hierarchy. However, this does not imply that innovations that originate in low-status groups do not diffuse. This is because members of the high-status group's adoptions of innovations go unquestioned. Therefore, the adoption of an innovation of low-status provenance does not risk their position in the status hierarchy. The result is that innovations can diffuse from the low-status to the high-status group, initially bypassing the middle-status group entirely. Figure 3a graphically shows these potential diffusion patterns with the lightest cells being the likely inter-group diffusion patterns in the presence of a strong status hierarchy.

Iteration 1 Source / Adopter	**High**	**Middle**	**Low**
High	A	D	G
Middle	B	E	H
Low	C	F	I

Fig. 3a. Iteration 1 Diffusion Matrix

At this point, it would appear that no innovation could diffuse across the entire hierarchy, but this observation would be inaccurate. This model treats diffusion explicitly as a function of provenance *and* time. So, while the cell B pattern would stagnate after the first iteration of the process, the cell G pattern would continue through a second iteration. Theoretically, this continuation would lead to the adoption of the innovation of low-status provenance by middle-status organizations because high-status organization had already adopted it in the previous iteration. Therefore, cell H would become an end state possibility resulting in the entirety of the low-status provenance column being feasible outcomes. Figure 3b graphically illustrates this end state after

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two rounds of diffusion.

Iteration 2 Source / Adopter	**High**	**Middle**	**Low**
High	A	D	G
Middle	B	E	H
Low	C	F	I

Fig. 3b. Iteration 2 Diffusion Matrix

While the status-audition model provides insight into innovation diffusion patterns, it also implies two distinct possibilities for the end state of an innovation once the diffusion process has occurred. The pattern created when an innovation originates in the high-status group leads to an end state where an innovation would tend to not fully diffuse in the status hierarchy, and, as such, can be expected to appear disproportionately in high- and middle-status organizations. This contrasts with the end state expected when an innovation has low-status origins, where our model predicts it will be found throughout the entire status hierarchy after some length of time. These expected end states generate propositions 4 and 5.

Proposition 4. Innovations of high- or medium-status provenance tend not be found in low-status organizations (Figure 4a).

Proposition 5. Innovations of low-status provenance tend to be found throughout the entire status hierarchy after some period of time (Figure 4b).

The theoretical implication of these propositions is the counterintuitive prediction that innovations of low-status provenance should have a larger impact than innovations of high-status provenance in terms of breadth of diffusion.

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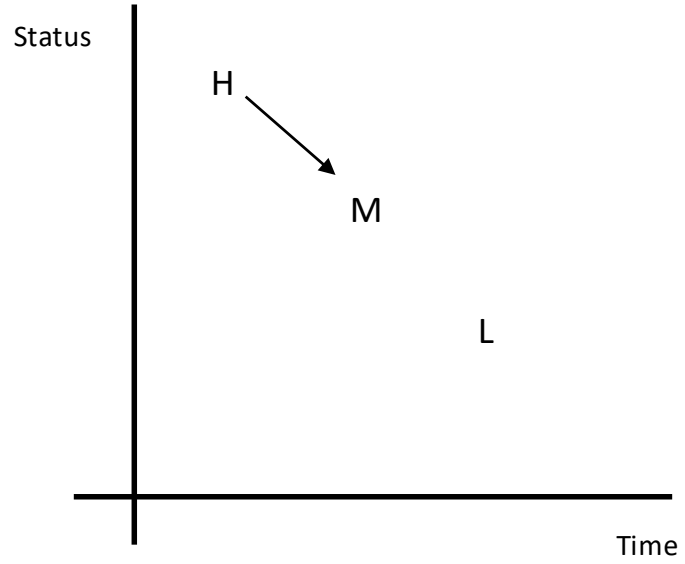

Fig. 4a. High Status Provenance Diffusion Pattern

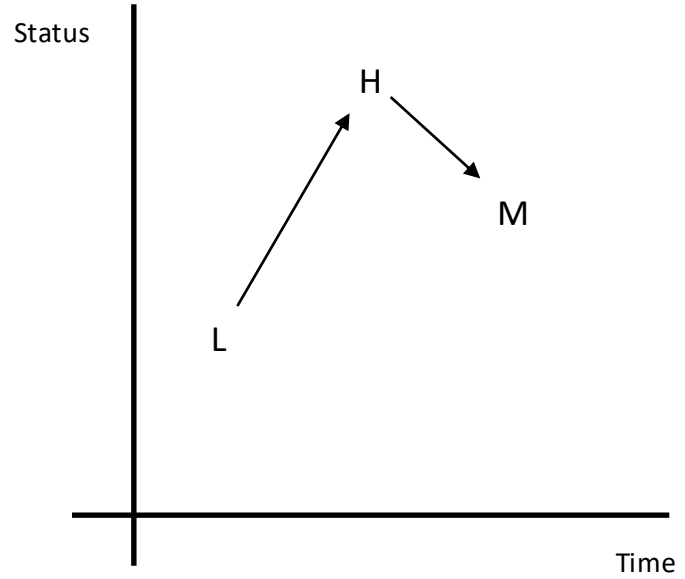

Fig. 4b. Low Status Provenance Diffusion Pattern

4 Discussion

The main contribution of this paper is to the development of the status-audition model, which helps resolve the conflicting empirical evidence on diffusion patterns. By raising the level of analysis to the status hierarchy and integrating the candidate-audience interface model with

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the model of status-based competition to create the status-audition model, this paper blends sociologic and economic mechanisms, along with an explicit consideration of time, to shed light on a possible explanation for the conflicting patterns of diffusion observed in past studies. As a result, this model helps free innovation diffusion research from the task of simply amassing more evidence for one side or the other of the low-to-high or high-to-low debate by providing a theoretical foundation for what type of diffusion pattern we can expect based on two readily observable variables: (i) an innovation's provenance, and (ii) the time since its initial adoption.

This study also contributes to the literature by demonstrating that an exhaustive status hierarchy is necessary to ensure we observe *complete* diffusion processes. Alternatively, if we use an incomplete hierarchy to map diffusion, and its directionality is simply extrapolated to missing status groups, our analysis risks errant conclusions. Finally, this study calls into question the completeness of past studies that have ignored middle-status organizations and the unique behaviors associated with them. The implication of the model developed here is that low-to-high versus high-to-low is a possibly misguided debate, although empirical testing of the status-audition model (preferably using data from past studies) is needed to determine whether this model does indeed represent an improvement over existing models.

4.1 Future Research

The next step for future research is to empirically test the status-audition model proposed and developed in this study. The ideal setting for such a test would have three defining features: first, it would be a status hierarchy with organizations of low-, middle-, and high-statuses. Ideally, this hierarchy would encompass an entire population of organizations in a given empirical setting, but at a minimum, it should be a representative sample of a relevant population. Second, this population of organizations would exhibit clear and widely recognized status rankings among members. Finally, this setting would need to have a reliable way for an outside observer to track the diffusion of innovations as strategic avoidance, symbolic adoption, and similar dynamics can make true diffusion difficult to detect, which in turn can cause systemic errors in its assessment using common measurement approaches (Nelson et al., 2014).

Examples of sites that would be appropriate for such empirical tests include professional services firms, creative services firms, universities, and other settings were status and output quality are loosely linked. As a concrete example of how the status-audition model could be applied and tested in future research, we could consider the ubiquitous rankings of business schools published by *U.S. News and World Report*, the *Financial Times,* and similar outlets as an empirical setting. In this context, we could then look for an innovation and track its diffusion throughout a status hierarchy. For example, we could examine on-campus "makerspaces" (places where students can freely access tools and materials to build things unrelated to specific classes), an innovation which originated in the most elite science and engineering universities such as MIT and Stanford. In this setting, the adoption of such innovations are often widely publicized in marketing efforts for academic programs, and would therefore be observable on a large scale to researchers. Our model predicts an innovation like these makerspaces, given its high-status provenance, would diffuse to middle-status universities (e.g., state research universities trying to imitate MIT or Stanford), but not to low-status universities (e.g., universities with mostly part-time students who are not

trying to imitate these high-status organizations).

In a similar vein, researchers could examine innovations with low-status provenance, such as online courses, to see if they diffuse in a linear manner (i.e., low- to middle- to high-status universities) or if they tend to follow the non-linear path suggested by our model (i.e., low- to high- to middle-status universities). As with the example of the maker spaces, the availability (and prevalence) of online classes in a given program could be observed on a fairly large scale by researchers and thus used to test one of the core predictions of our model.

4.2 Managerial Implications

The main managerial implications of our model derive from diffusion being an important performance indicator for many organizations and a strategic goal, in its own right, for many others. Although such diffusion has long been an objective of many organizations, the advent of viral business models, the accelerated pace of technological change, and the more general movement away from "linear reality" in management theory (Abbott, 1988; Van de Ven & Poole, 2005), have all helped rekindle interest in the dynamics of how innovations diffuse. For example, universities are more engaged than ever before in efforts to diffuse science-based solutions to pressing problems such as climate change (Trencher et al., 2013), and "institutional entrepreneurs" are engaging in concerted efforts to broadly diffuse changes in public policy (e.g., Maguire et al., 2004). So no matter what the underlying innovation or the driving force behind an organization's desire to diffuse it, a more nuanced and informed view of diffusion processes will be useful to managers facing increasingly accelerated, complex, and non-linear environments.

Beyond a more nuanced understanding of how to promote the diffusion of a particular innovation in pursuit of organizational goals, our model also offers guidance that aligns with some seemingly counterintuitive moves made by organizations in industries with strong-status dynamics. Returning to the example of higher education, a number of good-but-not-best universities have declined to participate in the influential ranking schemes mentioned earlier (Finder, 2007).

Given the visibility of these rankings, it might seem strange that organizations would forgo such "free" advertising; however, when viewed from the perspective of the status-audition model, such moves make more strategic sense. In a strict status hierarchy, a middle-status organization is trapped by its only source of legitimate innovation which stems from those organizations above it in the hierarchy. As such, these organizations will continue to struggle to do anything that is both unique and legitimate from the perspective of their traditional "audiences." Consequentially, in refusing to participate (i.e., refusing to "audition") by dropping out of the rankings process, it would allow such universities to either develop a new status hierarchy of their own design or attempt to signal value directly to potential students through other means, such as promoting holistic and experiential education instead of foregrounding faculty with illustrious publication records (often a main driver of traditional rankings schemes) (Finder, 2007). Essentially, leaders of these universities have realized such ranking schemes are a game that middle-status organizations cannot win and have necessarily refocused their effort on alterative innovations, audiences, or both.

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4.3 Conclusion

Merging models of status-based competition with the candidate-audience interface to analyze diffusion patterns leads to a more thorough understanding of diffusion processes. The status-audition model developed in this study uses middle-status conformity to expand on previously identified patterns of innovation diffusion on the basis of completeness within a status hierarchy. This results in the generation of five empirically testable propositions and two unique diffusion patterns. If supported empirically, this new model of diffusion would have consequences for management scholars as well as policy makers and management practitioners.

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ISSN 2183-0606
http://www.open-jim.org

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ISSN 2183-0606
http://www.open-jim.org

Journal of Innovation Management
JIM 6, 1 (2018) 55-79
HANDLE: http://hdl.handle.net/10216/111571
SM: Sep/2017 AM: Apr/2018

Data as a driver for shaping the practices of a preventive healthcare service delivery network

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Abstract. Though data is largely recognized as a new form of capital in the digital era, little research has been done on how innovations related to finding health professionals and using health services are evolving in smart-city-based, preventive healthcare service delivery networks. How does digital data affect preventive healthcare practices in service delivery networks? Evidence is provided from a smart city service delivery network on how data and ICT usage impact preventive healthcare innovations. The research is based on a case study highlighting the transformations continuously occurring in such a network. The results suggest that using data from different sectors will enable individuals and health professionals to communicate via intelligent personalized services, which will act as agents, guiding and coaching individuals to change their lifestyles to avoid chronic diseases. This study provides new knowledge on how continuously using health data can produce novel routines and innovations in healthcare networks over time.

Keywords. Digitalization; Data Driven; Practices; Innovation; Service Delivery Network.

Cite paper as: Pikkarainen, M., Pekkarinen, S., Koivumaki, T., Huhtala, T., (2018). Data as a driver for shaping the practices of a preventive healthcare service delivery network, *Journal of Innovation Management*, www.open-jim.org, 6(1), 55-79. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

The paradigm of healthcare is changing dramatically to respond to the challenge of increasing costs and the needs of an ageing population (Karanikolos et al., 2013). There is an ongoing transformation of health solutions – a change in which the interventions aimed at innovation changes are affecting smart city ecosystems, which typically include actors from multiple technology organizations, care providers and individuals (Best et al., 2012). ICT-driven innovations have been continuously developed in the health care sector to cover such basic practices as *a) finding the right health professionals and b) knowing how to use existing health facilities.*

The health innovations currently being developed are digital or digitally enabled innovations, which are driven by data and involve both physical and digital components for novel market offerings (Lusch & Nambisan, 2015) (for more on decision support systems, see, e.g., Wimmer et al. 2016). The digital components will help individuals access health care facilities more easily, independent of time and place, and support healthcare organizations in detecting diseases earlier (Raghupathi & Raghupathi, 2014). Therefore, the role of data is very crucial to such digitalization efforts (Ylijoki & Porras, 2016).

An increasing number of mobile applications are appearing every year that collect data from individuals in different domains. Already in 2013, almost a hundred thousand mobile apps existed and nearly 500 wearable devices had been released annually. (Sharon, 2016.) Individuals have started to use smartphone applications and wearable mobile sensors that make it possible to monitor, for instance, sleep, food, exercise, and blood sugar. This kind of self-measured data is helping individuals take better and more efficient care of their own health (Sharon, 2016). Nearly everything can nowadays be quantified by means of sensors, sequencing, laboratory tests and scans (Kish and Topol, 2015), and the collected data can be used for self-reflection, supporting individuals' efforts to change own behavior (Carver & Scheier, 2001). This means that the participatory role of individuals is a vital aspect in reducing healthcare costs (Sharon, 2016). Data is a valuable asset (Xie et al., 2016), and it will become even more valuable when data items from various sources form meaningful chunks of information (Ylijoki & Porras, 2016, p.7). Successful innovations should group sensing and supporting technologies as well as the needs of individuals around data in a manner that is highly personalized. This will make the individual a driver of his/her own health and wellbeing (McGrath & Scanaill, 2013).

A service delivery network consists of two or more organizations that are responsible for a connected, overall service (Tax et al., 2013). It is a network in which different players, such as smart city managers, physicians, hospitals and insurance companies, are continuously exploring better ways to understand the impacts of data on their services. They are co-developing and deploying services together with private companies, patients and health experts in order to reduce costs and improve their services (Pramanik et al., 2017.) In preventive healthcare, digital solutions are continuously changing and there are many unaddressed problems related to the digitalization and the changes being caused by it (Solanas et al., 2014).

A smart city is typically a coordinator organization that is responsible for responding intelligently to individual needs in the healthcare sector with respect to the service delivery networks (Pramanik et al., 2016). IBM and Intel, prominent guidance actors in this sector, identify smart health as one of the key fields that will make a smart city (Caragliu, del Bo, & Nijkamp, 2009).

ISSN 2183-0606
http://www.open-jim.org

The appearance of big data has great potential for innovations supported by the public sector (Roy, 2016) in smart-city-related networks (see, e.g., Moore, 2006; Diamond, 2009).

The network players, that is, healthcare organizations and cities, need to continuously discover and develop healthcare technologies that serve citizens. In the healthcare context, smart cities are often providing infrastructure-supporting data collection measures, processing, storage, transmission and sharing services. Additionally, they are often helping hospitals achieve smart healthcare services. (Pramanik et al., 2016.) Health data can be collected, for example, through the use of medical equipment, supplies and communication systems (Su et al., 2011). Thus, the prospects of using big data to facilitate smart cities are promising. From a company perspective, data can be considered like oil; combined with data management and analytics processes, data can provide various benefits for organizations in the service delivery network.

Although data is considered a new form of capital, only few academic studies have explored how data can be transformed from a digital resource into a valuable asset (Xie et al., 2016). Even fewer studies have addressed how to do this in smart-city-related, healthcare service delivery networks (see, e.g., Pramanik et al., 2016).

Furthermore, even though data can be used to provide better health solutions and reduce costs (Al Nuaimi et al., 2015), data as an important resource (or valuable asset) in healthcare decision making has remained a relatively understudied researched area. However, (Kawamoto et al., 2005), (Groves et al., 2013) and (Ferlie & Shortell, 2001), among others, have explored how data as a resource is changing the nature of innovations in the healthcare sector. Even fewer theoretical studies exist that explore how data as a valuable asset is changing practices in the preventive healthcare sector within the context of the network of private and public actors.

Little is known about the mechanisms underlying value co-creation in business-to-business networks that involve multiple partners (Sarker et al., 2012). It is also unclear how these changes in practices and processes are affecting the co-creation of new technology solutions, for instance platforms, data analytics, medical devices, applications and decision support systems. For situations in which market competition is increasingly being manifested as data competition (Xie et al., 2016), there is a need to better understand how data can be used by healthcare organizations and how data use as a valuable asset with respect to innovation is changing practices in the healthcare domain.

The purpose of this paper is to increase understanding of the impact of digital data (being generated from medical devices and healthcare records, produced by diagnostics tools and combined to facilitate individual self-management and clinical interventions) on preventive healthcare practices in service delivery networks.

The study was conducted in the context of a small Finnish city's healthcare network, one which contains players from both the public and private sector who share the goal of offering digital, personalized, high-quality health solutions to citizens, thereby decreasing overall future costs of public healthcare in Finland. This particular Finnish city is referred to as *"Smart city"* in the study. We define a service delivery network similarly as (Tax et al., 2013), that is, as a network in which the Smart city plays a central role as a coordinator interacting with other service providers.

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2 Literature review

2.1 Data-driven innovations in smart cities in the preventive healthcare domain

Digitalization is a megatrend, meaning that digital technologies are constantly being integrated into our everyday life. Digitalization can be seen as an important technological evolution that enables fundamental changes, called datafication. (Ylijoki & Porras, 2016). Organizations from both the public and private sectors have participated to datafication by collecting personal data and using it as a resource for innovation creation. Typically, governmental organizations collect personal data, such as taxes, place of residence and date of birth. Healthcare organizations maintain a variety of health records, whereas business organizations collect, for instance, customer data, including data on shopping behavior, transactions and receipts. In addition, the use of computers, mobile devices, sensors and access to information via the Internet is continuously generating personal data on human behaviors, habits and thoughts (Li et. al., 2011).

Data is a critical resource in healthcare (Beirão et al., 2017), and it plays an important role in improving the strategies for predicting, preventing and managing undesired health conditions (Collins & Varmus, 2015; Pinho et al., 2014). It is estimated that the amount of medical data will exceed 25,000 petabytes in the U.S. alone by 2020 (Pramanik, et al., 2017). Mobile technology and big data are new resources that are increasingly available and provide opportunities to personalize services and offer better service quality (Amit & Han, 2017). Previous studies define the term data and big data in different ways. For instance, Ylijoki and Porras (2016) found 17 different definitions for big data, many of which are related to data usage (see, e.g., Tiefenbacher & Olbrich, 2015; Baro et al., 2015; Bertolucci, 2013; Demchenko et al., 2014). Many companies identify data as a resource for developing valuable innovations (Ylijoki & Porras, 2016).

A large portion of big data is *personal data,* which is essentially information that can be directly or indirectly identified regarding an individual person (European Commission, 2016). Recently, there have been many discussions among industries and governments about the human-centered approach to personal data management (Eichelberg et al., 2005; Gnesi et al., 2014; Papadopoulou et al., 2015). In this approach, the role of the individual is changing from that of a data generator to that of an active data manager, meaning that an individual can manage his/her own personal data and decide if the personal data should be shared with other parties (for his/her own benefit). This new trend towards human-centered data management, or the *MyData* approach, can be one way to release data from organizational silos, making it an important and reusable resource for creating innovations, which will in turn help individuals to manage their lives (Poikola et al., 2015).

In the healthcare domain, many hospitals have begun using Electronic Medical Record systems to improve the quality and the coherence of the care process through automated guidelines and care pathways that provide data about patients for clinical work and research (McDonald, 1997). The electronic medical health records contain a large amount of data collected from each individual that could be used to improve and personalize the act of care taking (Raghupathi & Raghupathi, 2014). Also, cities around the world are collecting massive amounts of data that contribute to the production of useful information for citizens (Maglio & Chie-Hyeon, 2016). New forms of citizen involvement and oversight are essential for governments in order for them to pursue

and realize the benefits of data (Tydd, 2015). It helps health service providers to enhance the customer experience. It also creates new business opportunities for companies (Ylijoki & Porras, 2016). Both public and private players can use data to improve the health and wellbeing of citizens through preventive healthcare solutions and new diagnosis and treatment tools. Smart coaching is one way to use data in the preventive healthcare sector. Relevant empirical cases (see, e.g., Jung et al., 2010; Takacs et al., 2014) in this category aim to provide evidence-based coaching or management-based coaching on enhanced understanding of human behaviors and context (Maglio & Chie-Hyeon, 2016).

However, the proper deployment of data applications requires information and communication technology support, for instance through a data platform (Al Nuaimi et al., 2015), which is an important channel for public and private networks to gain access to data resources and offers new value for individuals (Xie et al., 2016). Data platforms enabled via technology development (Lusch & Nambisan, 2015) are being used for online transactions, virtual networking, open design and mobile interaction (Xie et al., 2016). Technology innovations such as platforms and applications provide easy access to data. Intelligent processing and data visualizations are important tools to support sustainable behavioral change (McGrath & Scanaill, 2013). Recently, three technical branches have greatly affected technology development in the area of big data and smart cities: 1) intelligent agents (meaning, an autonomous software entity that interacts with its surroundings) (Clancy, 2006; Wimmer et al., 2016); 2) machine learning (which has been used to analyze heterogeneous health data, especially in the area of medical decision making); and 3) text mining (which helps compile large volumes of textual and numeric data about patients) (Pramanik et al., 2017). Additionally, numerous artificial intelligence systems have been built to collect patient data and help health professionals in their decision making (Zakim, 2016; Wimmer et al., 2016). Thus, medical doctors need information from different sources to establish the right diagnosis and treatment plan. The patient needs to know and understand what the problem is and what can be done to improve the situation (Teutsch, 2003).

Table 1. Summary of the literature analysis

Theme	*Reference*
Personal data generation & management	(Eichelberg et al,. 2005; Gnesi et al., 2014; Papadopoulou et al., 2015)
Data platforms	(Al Nuaimi et al., 2015; Lusch & Nambisan, 2015)
Data analytics	(Clancy, 2006; Wimmer et al., 2016; Pramanik et al., 2017)
Personalized services, self-diagnostics & smart coaching	(Amit & Han, 2017; Teutsch, 2003)
Smart coaching	(Jung et al., 2010; Takacs et al., 2014; Maglio & Chie-Hyeon, 2016)
Clinical interventions	(Zakim, 2016; Wimmer et al., 2016)

ISSN 2183-0606
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2.2 Theories of practice

Theories of practice have their roots in the works of Giddens, Bourdieu, Foucault, Heidegger, Wittgenstein and Marx. Social practice theory is a type of social theory that proposes a vocabulary for thinking in new ways about how to consume and use objects in practice (Shove & Panzar, 2005). It can be used to describe and better understand the dynamics of innovation, relationships with novel products and emerging practices (Reckwitz, 2002, p. 249). *Practices* are activities that can be identified as the regular, skillful performance of human bodies. They also include routinized mental and emotional activities. *Social practices* are a set of routinized body performances that can be identified at the same time as mental activities. For example, according to (Black & Gallan 2015) playing football is a routinized performance that uses certain knowhow and interpretations of the other players' behaviors. In healthcare context, a routinized practice may consist, for example, of finding a health specialist or using a health service.

Practices are always social, shared, emerging, enduring, changing and disappearing across time and space (Giddens, 1984). This is the result of discourse, that is, the interactions between the actors related to these practices (Warde, 2004). Social practices also interact and sustain each other, such as eating often depends on cooking (Blue et al., 2016) or the use of health service depends on finding the right specialist.

Practices always take place between identifiable actors (Black & Gallan, 2015), and as such, following Ozanne and Anderson (2010, p.123), "we present a community-based participatory research method that engages consumers and stakeholders in research within their local communities to understand and solve difficult community problems." In the healthcare sector, however, the actors can be healthy *individuals* (when talking about preventive health services), *patients* (people who have a diagnosed illness), *doctors and other health professionals*, or third-party players, for example *an insurance company, personal trainers or ICT companies* (Black & Gallan, 2015).

According to (Reckwitz, 2002), football players are not just using a ball, they are affecting the reproduction of the game itself. In the healthcare context, both individuals/patients and third-party members can be seen as actors who reproduce the health services over the time.

Objects of practice and the things used to implement the practice are necessary components of practices. For instance, when playing football we need goals and a ball as basic resources, or things (Reckwitz, 2002). With digitalization, Electronic Medical Record systems, e-health, telehealth and m-health solutions as well as data convergence can all be characterized as new things that are increasingly being used to carry out common practices. Most social practices consist of relationships between different bodies, minds and objects. In fact, an individual's social network, family, friends and co-workers can affect the system of health and wellbeing (Black & Gallan, 2015).

A social practice contains specific forms of *knowledge* or *the information* that generates knowledge. That knowledge offers a way to understand the world. In the context of healthcare, patients are, in many cases, dependent on third-party actors for obtaining the information (Black & Gallan, 2015). On the other hand, third-party actors, such as health specialists, need information from patients to make the right diagnosis and decisions related to their healthcare (Kaba & Sooriakumaran, 2007)

According to (Reckwitz, 2002), social practices are routines that motivate the actors. Structure exists beyond time. A process is an application of structures in action. Social structure means that there is an agreement between actors who believe in the same objective. An agent is at the center of social theories of action consisting of mind and body, which in the social world has traditionally contained those individuals, meaning health professionals, whose decisions affect others. Therefore, it is difficult to conceptualize processes that break up structures.

3 Methods

Our research question calls for a holistic approach to the phenomenon under analysis; hence, we adopted a case study approach. The Smart city service delivery network was selected for the case study because it is a city that is ahead of other cities in the smart city agenda in Finland. It is also keen on trying to provide good healthcare services to its citizens and to improve the cost efficiency of the health services by decreasing unnecessary doctor visits and increasing virtual services. The city in question has eight health centers in which the patient data system is utilized to provide a diagnosis, laboratory results and entries related to medications. The sparse and widely spread population puts a strain on the city's health centers. A data-driven platform was created and launched in this city for use by its citizens on the 25th of March 2015 to alleviate this challenge. Although the participating companies work in global markets, the Smart city delivery network is located in Finland. The time boundary for the study was 02/2016 – 06/2017. The case study approach is appropriate because it offers researchers the means to investigate the relationships between the concepts of the phenomenon in the chosen context and not just describe them (Yin, 2014). Ketokivi and Choi (2014, p. 238) have provided a figure showing that if existing theories and literature provide the basis for formulating a research question. They claim that there is no possible a priori theoretical hypotheses can be introduced. There is the potential to contextualize an a priori theory otherwise, more generally, than the empirical context. In that case data would allow for if more general insights into the theory can be provided that would make it possible to elaborate more fully on the case study research.

A case study approach enables researchers to gain an in-depth understanding of a complex issue by scrutinizing the phenomenon using multiple data sources. The case study as an empirical form of inquiry is used to investigate a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly evident (Yin, 1984). A case study methodology is often used in different domains (Ozanne & Anderson, 2010; Yin, 2003). In these areas, case studies are conducted to increase knowledge about individuals, groups and organizations as well as about social phenomena. Case studies offer an approach that does not require maintaining a strict boundary between the studied object and its environment; on the contrary, the key aim is to increase understanding of the interactions between the two.

To allow for various sides of the studied phenomenon to be revealed and understood, the study's issues must be examined through multiple lenses rather than just one (Baxter & Jack, 2008). Defining the frame of reference of the study makes the context of the case study research clear, and it helps both those conducting the research and those reviewing the results of it (Runeson & Höst, 2008).

3.1 Data Collection

The data collection process consisted of three semi-focused workshops, several meetings and observations, in which the period for data collection was 18 months. The purpose of the workshops, meetings and ten interviews (including the health care providers, companies and insurance organizations) was to facilitate the service delivery network of the Smart city, discuss the roles of digitalization and a human-centered data management approach, and observe their actions and practices in the domain of preventive healthcare. The participants in the workshops were health directors, health specialists and private companies offering technology solutions for residents of the Smart city. Since the study was conducted from the healthcare provider perspective, data was not collected from end users of the solutions as such. However, many of those participating in the workshops also represented the end-user perspective regarding the solution since they were also users of the public service that the Smart city was offering to its residents (see Table 2).

Table 2. Participants in the workshops

Workshop date	*Workshop theme*	*Workshop participants*
15.4.2015	Journey planning for diabetes case	Service coordinator Supplier company director 1 Supplier company director 2 Project manager, Smart city Service manager, Smart city Service designer 1, Smart city Service designer 2, Smart city Health manager, Smart city Nurse, Smart city End user
9.12.2015	Value creation among service ecosystem actors	Health manager, Smart city Service manager, Smart city Two service designers, Smart city Project manager, Smart city IT service director, Smart city Deputy chief physician, Smart city Telecom company director Physician, Finnish medical society Two advisors, Finnish innovation fund
9.12.2015	2 meetings with Smart city medical device provider	3 managers from a medical device & data analytics organization working in the Smart city service delivery network

ISSN 2183-0606
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Workshop date	*Workshop theme*	*Workshop participants*
10.2.2016	Business models, data legislation and regulation	Health manager, Smart city Two service managers, Smart city Deputy chief physician, Smart city Administrative chief physician, Smart city Project manager, Smart city IT service director, Smart city Two advisors, Finnish innovation fund Telecom company director Physician, Finnish medical society
Spring/Autumn 2016	Observation	Observations in the 3 Mydata alliance meetings in which the private companies were present

The first workshop was held on the 15th of April 2015. The aim was to increase understanding about the potential of digitalization and a human-centered data management approach in the Smart city service delivery network. Those attending the workshop included actors from both the current and potential future service delivery network: healthcare providers and system providers, platform providers and data collection device providers.

The first workshop was centered on a service journey planning session for an online self-care-oriented local portal service that had been built for Smart city residents. The focus of the workshop was on the prevention of diabetes. Within the service journey planning session, participants identified service user personas, that is, the archetypes of users who embody the key characteristics, goals and needs of the target user group, as well as the key service delivery network actors and their roles. Eight months later, five Skype meetings were organized together with researchers and Smart city players. During these recorded meetings, digitalization and human-centered data management was openly discussed.

The second workshop was held on the 9^{th} of December 2016. The workshop focused on value creation among the ecosystem actors. Value network analysis provided a way to understand the dependencies between organizational roles and relationships in the service network (Allee, 2008). From a resource perspective, network actors can combine or exchange need-based and solution-oriented information or create new sources of value.

Four additional Skype meetings were organized after the workshops in order to understand the potential of technologies and data usage in the service delivery network. In these meetings, both current and future scenarios were discussed together with researchers and *Smart city* directors.

The third workshop was held on the 10^{th} of February 2016. In this workshop, the same group of participants discussed the business models and regulation aspects that were both speeding and hindering changes. The aim of the workshop was to obtain more insights about the role of private companies in the change process. Data was also collected from a firm perspective in a meeting in which the researchers discussed digitalization and a human-centered data management with three managers from an organization providing healthcare devices and data analytics. Additional data used in the analysis included feedback surveys and web pages related to the Smart city

network. Observations were also conducted in three Mydata alliance meetings, in which some of the network companies continued to present and discuss ideas about their future approach in terms of data management and health service creation. All of the workshops and meetings, excluding the meeting with the company providing medical devices, were recorded in audio format. Extensive notes were produced in the meeting with the company providing medical device. All recorded data was transcribed before the data was analyzed.

3.2 Data Analysis

The change in healthcare practices in the Smart city service delivery network was analyzed using key elements from social practice theory. In our study, the practices included 1) finding the right health service and 2) using the health service appropriately. The key constructs used in the analysis were *process, agent, things* and *discourse*. The key elements of social practice theory were adapted from (Reckwitz, 2002) and used in our analysis in the following way:

1. *Process*: The process of finding the right health professionals and using the solutions correctly were analyzed throughout the different phases (structure) and changing routines.
2. *Agent (body/mind):* Health professionals (nurses, doctors, etc.) gain new specific *knowledge/data* that affects discourse (i.e., communication between the systems and personnel).
3. *Things*: All medical devices, applications and data platforms are necessary resources for carrying out the practices used to generate a health solution.
4. *Discourse:* Traditional communication (e.g., face-to-face communication and telephone calls) and communication via systems, i.e., data exchange and data platforms, need to be analyzed in a city context. External discourse refers to communication external to health experienced at home and at the city health center with respect to best practices. Internal discourse pertains to communication taking place inside the health center among health professionals regarding best practices.

The thematic analysis was completed using comparative content analysis (Bryman & Bell, 2015), which was done by reading interviews, comparing and interpreting notes and transcripts from the interviews and workshops, and reviewing additional data. The codes were again categorized as codes and sub-codes. When finished, the authors went through all the material once again in order to identify a first set of research questions. The analysis technique used was tabulation (Runeson & Höst, 2008), where the coded data was arranged in Excel, making it possible to obtain an overview of the data. After conducting the theme analysis, the results were arranged in chronological order using process notations. The data was analyzed using two time dimensions: short-term and long-term evolution of practices.

Context of the study The unit of analysis in our case study was the service delivery network (Fig. 1). In a service delivery network, each service provider interacts with the client, who in turn relies on other providers to contribute complementary portions of the overall service. Typically, in a service delivery network the client requires expertise from several professions regarding health management services. Each player in the network is impacted by the client's

experience. In addition, the providers must interact with one another to coordinate the overall service. (Tax et al., 2013.)

Because the Smart city is a public player, it must conduct public procurement and select the right tools to support the newly emerging social and health practices. The Smart city can be considered the coordinator of the service delivery network. In our context, the client is the resident that the service is targeting.

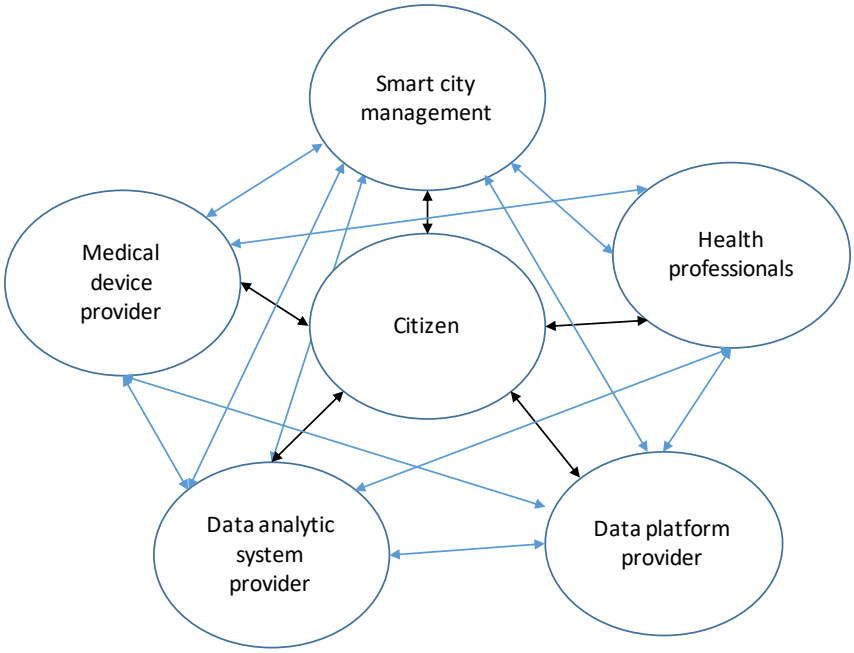

Fig. 1. Smart city service delivery network.

The overall service consisted of several technical components: 1) the data platform, selected from a private organization that had spent ten years developing a platform solution suitable for the purposes of the Smart city, with minor modifications; 2) a data analytics system that was targeted to support health professionals, selected from private player who luckily had a well-validated, nearly completed solution for the Smart city purposes; and, 3) medical devices from one large global company (e.g., peak flow meters and blood pressure meters, blood sugar analysis devices and applications) that allow individuals to measure their condition at home. All of these players were involved in our research workshops and discussions, which were then used as a baseline for data analysis.

4 Results

The Smart city had already for a long time emphasized improving the healthcare innovations, the "things," that they were offering to both health professionals and citizens. They were extremely interested in the possibility of using data to improve the care experience of patients as well as the "discursive" communication between systems and actors. The primary goal of the main players

in the service delivery network was to increase the possibilities for self-monitoring one's health as well as self-diagnostic services. This was done in order to accomplish the following:

> *empower people either to make some preparations before coming to see the doctor or to take actions to support their own health improvements in such a manner that they would not even need to see the doctor.* (Health director from Smart city)

A new type of "discourse" with citizens, private players, made it possible for the Smart city to achieve its goals and to plan new data platforms. It also helped the city to use data analytics to provide its "agents" with advice and recommendations from the healthcare professionals and point out pressing issues regarding personal health as well as offer clients an alternative way to contact healthcare centers. This data changed the routinized practice of agents, causing them to interact with citizen through the platform instead of direct face-to-face communication.

Two user scenarios were identified by the Smart city management and health specialists to investigate the practices in the service delivery network, where several suppliers combine their resources to offer joint service concepts for city residents. In the first case, we investigated the co-creation of data-driven health innovation in the case of diabetes. The diabetes scenario consisted of two supplier companies, a platform provider and diabetes solution provider, doctors and service management. The platform provider in the diabetes case had been operating in the focus market for a long time. The second scenario aimed to build data-driven innovations for the case of chronic obstructive pulmonary disease. In this scenario, we selected two supplier companies (a data collection device provider and a cloud-service and decision-making systems provider), Smart city health service management and doctors as participants. We collected data using a connected PEF meter for asthma status monitoring as well as a cloud service where the data can be transferred from end-user devices.

4.1 2015-2016

The primary challenge for the Smart city was that it has been receiving an increasing number of health requests from its citizens. These requests could not be solved rapidly enough with the existing resources. Fig. 1 displays the new process and changes that the Smart city generated as part of its routinized practices over time (structure).

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Data from face to face discussions & first home measurements	Data from health records & selected medical devices	Data from different sectors due to personal data management approach
First home measurements manually in selected cases (case of sickness, not prevention	More home measurements e.g. in case of astma and diabetes, data sent automatically to platform	Continuous home measurement & symptom evaluation guiding individual to right professional when needed
Face to face meetings with doctor, role of nurse was increasing	Symptom evaluation practice & guidelines for individuals to improve life style; virtual meetings with nurse / doctors	Continuous, personal guidelines to improve life style, personal rewarding, virtual appointments with any professionals when needed
2015	**2016**	**2017- 2025**

Fig. 2. Data impact on practices — finding the right health professionals and using the solution.

The first step in improving discourses regarding individual health in 2015 was to create a new symptom evaluation practice in which the individual explains her/his symptoms using a digital platform. The idea behind the new practice was, first, to collect all the available data about a person's eating and exercising habits, blood pressure, and so forth, and second, to use it to provide the relevant information about residents to the proper agents, that is, doctors and nurses. The objective was that the agents would carry out the practice to help the person immediately should the situation get any worse (e.g., blood pressure is routinely abnormally high in in the case of chronic obstructive pulmonary disease).

After responding to the symptom evaluation, an individual would be empowered to use the application either to improve his/her lifestyle or contact a health professional. Previously, the only agent in the system had been health professionals, who had received new specific knowledge/data about a patient and changed their course of action accordingly. With the new practice, individuals took on the role of agent, helping themselves based on the existing discursive guidelines provided to them by the intelligent data analytic system.

An electronic health check was another practice that the Smart city offered to its residents via a new data platform, decision support systems, medical devices and applications. The electronic health check supports people's access to the right types of health professionals. The health check was based on a query in which a person provided personal particulars like age, weight, blood pressure and cholesterol level.

> *Based on this information, the system gives the person a potential risk evaluation related to any illnesses, such as diabetes, coronary artery disease or dementia, or alternatively, gives [an indication of] how many healthy years the person will most likely have with this particular lifestyle.*

In order to achieve the goal of changed practices, the Smart city needed many new innovative tools, "things," for example a platform, analytics, medical devices and applications that helped

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the agents (i.e., health professionals) make remote decisions about an individual diagnosis. These innovations were created based on advice coming from a discourse, a decision-making system, which uses both medical and personal data.

One primary challenge that the Smart city players had noticed already in 2015 was that they had good practices and solutions for sickness management, but insufficient tools and practices for helping citizens prevent future healthcare problems. To support its preventive healthcare target, the Smart city ordered a data platform, decision support system and application "things" that offered individuals a coaching practice based on the existing data. Through the new service, residents can engage in "discourse" with a coaching program and use it to increase their levels of physical activity and manage their eating habits. If the person uses activity trackers, all data can be included in the database in order to give him or her an even better coaching program and guidelines for improving her/his lifestyle.

Through the selected platform, the decision support system, medical devices and application, the Smart city offered to its residents three different options for evaluating their symptoms. For example:

> *The system asks if the person wants to see a doctor or if he/she just needs medical advice for a health challenge. If the answer is medical advice, the system gives her/him guidelines for how to improve her/his health situation. If the analysis is positive, the person can pick up medicine from the nearest pharmacy within a few hours of the query using an electronic receipt.*
>
> *Data is collected from both professionals and individuals. With this system, the data from different sources (e.g., laboratories, blood sugar measurements and different diagnoses) are integrated and sent to the decision-making system, which analyzes the data and returns it to the individuals.*

The city management realized that they could not capture the full benefits of the collected data before each individual has established her/his own data account, in which the collected data from different sources, such as self-measurements, medical checks (e.g., laboratory results), bank details and location information, can be stored. Luckily, in Finland the intention has been to solve this problem by building a national database (Kanta and Omakanta), which can be seen as an individual's data storage facility for personal medical and self-measured data (http://www.kanta.fi/en/web/ammattilaisille). It allows for the centralized electronic archiving of patient records and long-term storage of the data from different hospitals. The Kanta and Omakanta database plays a central role in the exchange of information between healthcare service providers. Individuals in Finland can see the data recorded by the healthcare units in the OmaKanta service (http://www.kanta.fi/en/web/ammattilaisille/earkiston-esittely). Unfortunately, the Smart city planners found the movement towards the OmaKanta and Kanta database to be too slow; they were ahead of others in their healthcare practices and solution offerings.

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4.2 Scenario 2017–2025

When we were asking about the future practices, the experts from the Smart city network estimated that at some point, there would start to be so much variety in the data collected from each individual that no person would be able to manage it all by themselves. In the future, each person will most likely adopt the practice of using the collected data with intelligent coaching applications, which will help them to continuously check her/his health status, working as an "agent" to improve her/his lifestyle.

Likewise, in the future the health check can be done anytime and anywhere with intelligent analytics and a decision-making system based on the information that the person requests, which will have been shared through a platform operator from his health profile/account. The experts predicted that the increased amount of data coming from different sectors will lead to new opportunities for more accurate, personalized guidelines and diagnoses for the Smart city and those providing its tools:

> *For example, if the person smokes, he/she will receive some rules and an action plan for how to quit; or, if she/he is overweight, she/he will receive daily guidelines for how to do more sports or how to eat more healthily. If he/she has breathing problems, he/she can receive guidance on how to start using a BEF meter to monitor his/her breathing situation.*

If the breathing problems increase, the person may receive an automatic invitation for a digital appointment with a doctor. If the coaching solution is linked with data coming from different sectors, then the person can receive automatic notifications and virtual appointment suggestions from the system for cases in which he/she needs to either see a doctor or some other professional or receive virtual coaching support for his/her personal situation. In this case, the decision support system would begin to act quite intelligently due to the large amount of data that it would seemingly have a "mind" of its own, in addition to a "body," so that we can start to redefine it almost as an "agent" who is proposing actions to support the overall healthcare system based on real-time data.

According to practice theory, every practice implies some intentions — wanting some things and avoiding others. In this case, the Smart city players had conducted a survey asking individuals what they wanted in a healthcare service delivery network. According to their study, individuals want different things: some want face-to-face doctor appointments, while others are happy with a digitally aided solution that would help them avoid unnecessary doctor visits.

According to one expert in the Smart city:

The use of data will radically change the "discursive" doctor's appointments from a social activity to digital coaching. More often, the nurse contacts the person and the doctor is met more often as a virtual activity.

From the object/things perspective, this will increase the need for new digital communication tools, applications and medical devices, all of which can support the development of different types of personalized services that will offer an overall digital solution to individuals' health problems.

Since every practice implies particular intentions, including wanting certain things, it is important

to find practices and new ways to use data to create new systems and motivate individuals to live a more healthy life. There may also be a need to use personal data from different sectors in order to find different, more personal ways to reward people for improvements in their lifestyle.

In the personal data-based health care system, it will be possible to use data to create rewarding services to identify what a person is interested in. Therefore, it will be possible to provide rewarding lifestyle improvements based on what the person has himself/herself said.

For instance, if a person is interested in taking a holiday trip, he/she could obtain a discount on the price of the trip if he/she has achieved the yearly activity targets. Use of a personal data approach could also enable new types of collective rewarding mechanisms. Fourteen experts in the Smart city mentioned that perhaps in the future, new players, for instance insurance companies, could start to use the data with the permission of individuals to give out rewards for positive actions, such as discounts on insurance payments.

It would be the best way to save costs, if we could really affect the way that a person lives. If many individuals would do more for their own health, there would be far fewer people in the future asking the public healthcare service for help.

Experts in the Smart city also mentioned that the data analytic tools and services would offer additional value to individuals in order to motivate them to share their data with health professionals or personal coaches.

In the future, the insurance companies and private hospitals will most likely start to give discounts to people who are monitoring their health status, using data analytics and improving their lifestyle, showing concrete results by doing so.

4.3 Summary

The key result of this study is an increased understanding of the change that is occurring in the preventive healthcare sector due to the use of data as a valuable asset. The main findings discussed throughout this article are summarized in Table 3.

Table 3. Key Findings of the study

Practice theory concept	*Key Findings*
Process/Practice:	The selections made in the technology structure also resulted in dramatic changes in the routinized practices/actions of individuals and health professionals.
Agent (body/mind):	It was predicted that in a future scenario, the intelligent decision-making system innovation might be like an agent having a "body" and "mind," one who also takes an active role in analyzing the data and guiding people to see the right professionals in a virtual setting.

Practice theory concept	*Key Findings*
***Things*:**	Smart city ecosystem managers realized that many things are needed in order to use the data: a platform, intelligent decision support system, medical devices and applications. Use of the tools also affects the way that the practices are evolving. It was also revealed that things will have an even more important role in the future health care system due to data usage.
Discursive:	Ways of communicating are changing from face-to-face, social forms of communication to more digitally aided guidelines that target behavioral changes and are either received by the system or through digital communication with professionals that are selected for the particular person based on the data.

5 Discussion

From a practice theory perspective, our study supports the argument made by (Reckwitz, 2002) that the actors (individuals and health professionals) actually affect and produce novel, routinized practices in the health sector over time. Typically, new practices emerge if there are people who are able to enact them and who are willing to keep them alive (Blue et al., 2016). Our study demonstrates that the changes in, and emergence of new, practices is also dependent upon smart city players' capability to select and deploy innovations, such as platforms, applications and medical devices.

Our study also shows that in this transformation, the roles of actors are undergoing changes as well. For instance, in the future individuals will have more responsibility to perform self-measurements, practice self-data management and make improvements in their own lifestyles or health conditions than before. By doing so, they will communicate more with things/agents (medical devices, applications and platforms) instead of having direct human contact. This finding is in line with that of (Maglio & Chie-Hyeon, 2016), who also remind us that in the future, it is likely that data analytics can contribute to the automation of information actions, meaning that systems will act on their own to provide support for people. Other authors have also recognized that medical professionals can no longer be expected to be the only source of knowledge regarding an individual's own wellbeing (Frow et al. 2016; Ostrom et al., 2015).

One interesting question for future research raised in our analysis is as follows: What will be the role of data platforms, intelligent decision-making systems and medical devices in future service delivery networks? Moreover, will companies be creating symptom evaluation and coaching systems intelligent enough that they almost appear to have a "mind" and "body" of their own, capable of acting as new agents who will monitor and steer the health of individuals more often and in a more reliable manner than medical doctors or nurses?

This research supports the claim made by (Shove & Pantzar, 2005) that individuals and orga-

nizations are both involved in creating new practices. Like the Smart city, other cities should also strongly endorse the use of data and improve novel digital, human-centered solutions and personal data management to support the empowerment of individuals, decrease the cost of healthcare and increase business opportunities for organizations. One bottleneck in current data sharing results from the fact that individuals fear that their personal data will end up in the wrong hands and will be used against them in some future situation (Harjumaa et al., 2016). (Poikola et al., 2015) claim that the human-centered data management approach will need to provide transparency mechanisms that openly show how organizations will use the data and, in doing so, bring value to the individuals.

This study reinforces the belief of (Porter & Lee, 2013) that the processes and technology solutions employed in the healthcare domain are currently undergoing dramatic changes, in which individuals are expected to move from passive receivers to active contributors. They (individuals) will play an ever more active and varying role in the preventive healthcare system, controlling their own data by becoming agents in the system. On the other hand, doctors are expected to use data-driven decision making systems and virtual communication to make appropriate diagnoses of the case independent of time and place.

Data on the daily life, medical status and risk factors of individuals has often been collected and stored separately in different places. Integrating that data so that it can be used in health care will provide possibilities for *personalizing* healthcare based on different types of data and data analytics. However, the most successful health innovations will use data from different sources regarding the needs of individuals in a manner that is highly personalized and supportive, and it will continue to evolve with the individuals according to their needs (McGrath & Scanaill, 2013). Data can be seen as an enabler for the emerging, more personalized health solutions. These solutions include technology enabled e-health, telehealth or m-health services that provide easy access to data from different sources with intelligent ways of processing and presenting the data (Kvedar et al., 2014).

Our study has implications for policy level innovation management. It supports the argument of (Kwon et al., 2015) that the role of smart city policy makers as network coordinators is not only necessary for innovation, but can also lead to changes in the business operations occurring in their particular area of expertise. The way that things, for instance data collection devices, platforms and analytic tools, are invented and used is also changing the practices taking place in the city network, and vice versa.

5.1 Limitations

Our study has the following limitations. First, it is a single case study of a service delivery network, which affects the generalizability of the conclusions. Yet, there are good reasons for selecting such an approach. Focusing on a single case means that the study could be done *with great subtlety* compared to a study of multiple cases. According to (Yin, 2014), such a study may act as a prelude to further studies on a relatively new topic, in this case digitalization. The second limitation concerns the completeness of the study. Only a subset of the participants acting as *smart city* players participated in the workshops and meetings. We did, however, carefully select the subset of people and their roles in the process together with the appropriate Smart

city representative, including representatives from each identified player in the Smart city service delivery network. The third limitation concerns the amount of data used for the analysis. Each of the three-hour workshops and several meetings was carefully structured and prepared. Thus, they resulted in a large amount of recorded and transcribed research material from an extended period of time.

As with any theoretical approach, practice theories have their strengths and limitations. Although practice theories allow us to understand the problematic dichotomies existing between individuals and social structures, rational actions and habits, it offers quite complex guidelines for intervention (Blue et al., 2016). Our study is in line with the findings presented by (Blue et al., 2016), who argue that practice theories can be used to support the design and implementation of strategies and policies aimed at improving public health (Blue et al., 2016). In fact, our study shows that social theories of practice are useful for making sense of the changes that are occurring in the health practices, in part due to the new innovations that are radically changing the behavior of both individuals and professionals in public health contexts.

Although our study is about the service delivery network, it assessed how practices are generated more from the perspective of the other network players than from the end user (i.e., customer) perspective. The Smart city network players continuously tried to rethink and create the services from a customer perspective. However, it would be interesting to take a closer look at how customers are actually involved in the service creation process for the Smart city service delivery network and how their role and feedback actually impacts the evolution of healthcare practices and tools. The existing literature has failed to evaluate the impacts of co-creation in the networks in which the software vendors are working with their client organizations (e.g., smart cities) to co-create value for end users (Sarker et al., 2012). In this study, we evaluated the implications of the value co-creation networks established between the Smart city and its vendors, focusing our analysis on best practices and how new tools are developed. In the future, it would be interesting to also evaluate the impacts from the end user and cost perspectives. In fact, longitudinal research would be needed to show how successful the Smart city network actually has been in terms of meeting its targets of introducing benefits to customers by improving the end user experience and overall efficiency of the health care service.

5.2 Conclusions

Over time, the Smart city network adopted digitalized solutions and began to exchange and disseminate ideas within and between the public, private players and individuals. From its origins, the use of data has and will transform the practice of locating the right healthcare professional and using the appropriate health solution. After engaging with the new process, the Smart city network players have managed to empower individuals to change their own lifestyles. With these changes, the Smart city created more time for doctors to focus on those patients that, according to the data, really need and want their help. The change has required the Smart city to make new investments and engage in co-creation efforts with different players in the private sector in order to co-create new "things": platforms, data analytics, an intelligent decision support system, medical devices and applications. The co-creation of these new things has radically changed the routinized actions of different actors in the service delivery network. Moreover, the

discursive communication between the actors has changed from face-to-face discussions to mobile phone advice. In this context, the role of intelligent decision support systems and applications will change from things to agents, who have a body and a mind, and active players in the system helping individuals in how to use the data. A personal data management approach in which individuals can control their own data seems to be the way to release data from different sectors so that it can be used by networks like a smart city to support individuals.

Acknowledgements The authors would like to thank Tekes (The Finnish Funding Agency) and the Digital Health Revolution project for supporting the study as well as personnel from the Smart city for participating in the study.

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ISSN 2183-0606
http://www.open-jim.org

Journal of Innovation Management
JIM 6, 1 (2018) 80-110
HANDLE: http://hdl.handle.net/10216/111571
SM: Jan/2018 AM: Mar/2018

Linking Innovation Measurement to an Implementation Framework: A Case Study of a Financial Services Organization at the Front End of Innovation

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Abstract. Many organizations find themselves at the "front end of innovation", that is, they know they need to do something, but they are not quite sure what to do. Through our research, we have learned much more about the practice and implementation of innovation. For example, we have discovered that innovation is most successful if there is leadership support for a culture of innovation combined with systematic approaches to embed and reinforce innovative behaviours. This article outlines a case study of an organization in the financial services industry who began their innovation journey a number of years ago, and reports on the progress of a sustained and deliberate approach. This research highlights the relationship between an innovation cultural assessment model and its utilization as a framework to manage the implementation of activities to support the development of an innovation approach in a context specific scenario. A case study methodology was adopted that utilized an innovation culture model as a measurement tool. By actively observing the organization, including two cultural assessments over a 4-year period, the findings indicate that an innovation assessment model is useful as an approach to advance the innovation agenda in the organization. In this sense, the research findings are of interest to academics looking to conceptualize a broader implementation framework that is closely associated to the innovation measure associated with the organization. As well, practitioners looking to advance their innovation platforms will find the framework useful as they plan initiatives aimed at advancing their innovation agendas.

Keywords. Innovation culture management, Implementation of innovation, Strategy.

Cite paper as: Dobni, C., Klassen, M. (2018). Linking Innovation Measurement to an Implementation Framework: A Case Study of a Financial Services Organization at the Front End of Innovation, *Journal of Innovation Management*, www.open-jim.org, 6(1), 80-110. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1. Introduction

Innovation is believed to be a key differentiator and a necessity in achieving competitive advantage (Amit and Schoemaker, 1993; Prahalad and Hamel, 1990). As a result, there has been a significant interest in innovation implementation, particularly with respect to innovation culture and its effect on strategy and financial performance (Naranjo Valencia et. al, 2010; Aas and Pedersen, 2011; Christensen and Raynor, 2003; Govindarajan and Trimble, 2005; Hamel, 2002; Hammer, 2004; Senge and Carstedt, 2001).

However, many organizations are at the front end of innovation, and our experience as both academics and management consultants has led us to conclude that many organizations know they need something, but are not quite sure what. As a result, many efforts to develop an innovation approach are either piecemeal, under resourced, or run off 'the side of the desk.' This leads to a lack of sustained effort, and often, frustration and failure.

As the appetite for innovation in organizations gains momentum, research on how to best approach it continues. Research on innovation in the financial services is no different. Specific aspects of innovation in the financial services industry have been researched, such as regulation (Nekrep, 2013), competition (Bos et al., 2013; Aghion and Griffith, 2005), implementation models (Bukowitz, 2013), leadership (Johne and Harborne, 2003; Harborne and Johne, 2002) and service and product innovation (Vermeulen and Dankbaar, 2002; Ozdemir and Trott, 2009).

We also know that there is a linkage between innovation and performance. We now have research to support the relationship between innovation and performance in organizations (Nambisan, 2013; Wong, 2012; Jimenez-Jimenez and Sanz-Valle, 2011; Dobni, 2010; Dobni, 2011; Dobni and Klassen, 2015). Simply stated, innovative organizations – regardless of the industry generally perform better.

Our interest is in connecting two important streams of innovation: innovation culture measurement and innovation implementation frameworks. By linking these two streams, we address a notable gap in the literature. For example, innovation culture measurement models exist (Dobni, 2008; Wang and Ahmed, 2004) but have not yet been fully used to impart an implementation framework. Further complicating the issue is that not one size fits all. It seems that every organization wants or needs slightly different approaches; approaches which are tempered by the competitive context, the nature of the industry, and internal support and resources for innovation. Thus, implementation of innovation is highly contextual and depends on each organization's internal and external environment (Ortt & van der Duin, 2008).

The research objective is to understand whether an innovation culture measurement model can be used as an implementation framework in the context of a financial services industry. The innovation culture assessment model utilized in this study was the (Dobni 2008) model. It assesses innovation culture by measuring twelve drivers (determinants) of innovation and categorizes the drivers into the following four dimensions: leadership, resources, knowledge management, and process. These four dimensions were used as an implementation framework by the organization profiled in the case study to advance their implementation agenda. Our view is that using an implementation framework based on a measurement tool is pragmatic, practical and logical based on the simple premise of, "what gets measured gets done". This notion is similar to the concept of measuring strategy through a balanced scorecard (Kaplan and Norton, 1992) and then subse-

ISSN 2183-0606
http://www.open-jim.org

quently developing initiatives to advance the strategic intent. The scorecard not only provides a benchmark measure to assess current state and progress, but focuses the implementation activities to those that have the most impact on strategy. The financial services industry provides a relevant innovative context given the nature of change in industry due to phenomenon such as fintech (Schueffel, 2016). Although our research has application across industries, organizations that have challenging and changing context, such as the financial services industry, will find the application particularly relevant.

This article discusses the relative literature related to innovation definitions, performance, innovation culture measurement, and the context of innovation in the financial services industry. The intent of this review is to highlight the notable gaps in the literature as well as to inform our case study. A methodological discussion of the research approach and narration of the case study findings follows. We conclude with a discussion on management considerations and final thoughts of the case study related to using an innovation culture assessment model as an implementation framework.

2. Theoretical Perspectives

2.1 Issues of Definition

Research has defined innovation in a variety of ways. Often the definition depends on the nature of the research and context of the study. Many definitions infer the introduction of a behaviour or idea as a central theme in explaining innovation (Cordero et al., 2013; Jimenez-Jimenez & Sanz-Valle, 2011). Employee actions that are a result of creativity or change have been associated as an innovation outcome. Examples of this include ideas surrounding new product/services or modifications to existing ones, restructuring or cost savings initiatives, better communication practices, new techniques to solve old problems, or unique employee responses to unscripted situations (Martins and Terblanche, 2003; Robbins, 1996; West & Farr, 1990). Other definitions (Hamel, 2006; Christenson, 1997) suggest that innovation is contextual, and the determination of whether or not activities or behaviors in an organization can be regarded as innovative will be constrained by this context.

The determinants of innovation include leadership (Mumford and Licuanan, 2004; Crossland and Hambrick, 2007), strategy (Miller and Friesen, 1982; Tipping and Zeffren, 1995; Miles and Snow, 1978), organizational structure (Damanpour, 1991; West et. al, 1998), portfolio and project management (Cooper et al., 1999) and learning and knowledge management tools (Crossan et al., 1999; Alexy et. al, 2013). This list is by no means exhaustive but illustrates the breadth of the research field related to the implementation of innovation. Attempts to synthesize this literature have been completed, but have resulted in a general conclusion that the research is fragmented and often narrowly focused (Crossan and Apaydin, 2010).

We have also concluded that the definition is context specific and ranges from uni-dimensional, for example, the amount of budget allocated to research and development, or the number of new patents registered on an annual basis, to multi-dimensional and disruptive, which materially alter industries or create entirely new industries. These would include products/services innovation, process innovation, technological innovation, and business model innovation.

It is also important to note that innovation is process-oriented and culture-based (Drucker, 1991; Hellriegel et al., 1998; Robbins, 1996). Given our focus on understanding an innovation framework, for definitional purposes, we adopt the broad definition of (West & Farr 1990, p. 7) whom define innovation as "the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society."

There is no question, that innovation is multi-dimensional, multi-disciplinary, complex and is impacted by many factors (Baregheh et al, 2009; Kline and Rosenburg, 2010; Van de Ven, 1986) and in this vein, is similar to culture. (Schein 1984), points to culture as the prerequisite to innovation in organizations. The prevailing conclusion is that a focused and aligned culture appears to be critical to the success of any organization (Ahmed, 1998; Martins and Terblance, 2003; McLean, 2005; Mumford, 2000), and if you can manage the context, then you can affect culture to direct desired behaviors. This is the premise of behavior-action-outcome modelling (Dobni and Luffman, 2003) which can be applied to innovation activities.

Drawing from our practical experience, many organizations simply do not know where to start – that is one of the issues with being at the front end of innovation. Organizations need a point of reference, and we propose that the measurement of innovation culture provides organizations with a benchmark to assess the current status of innovation. It also provides a platform to plan how they can improve innovation culture. This linkage provides the basis of utilizing the innovation culture measurement model as a framework for innovation implementation going forward. The following model articulates our scope of inquiry:

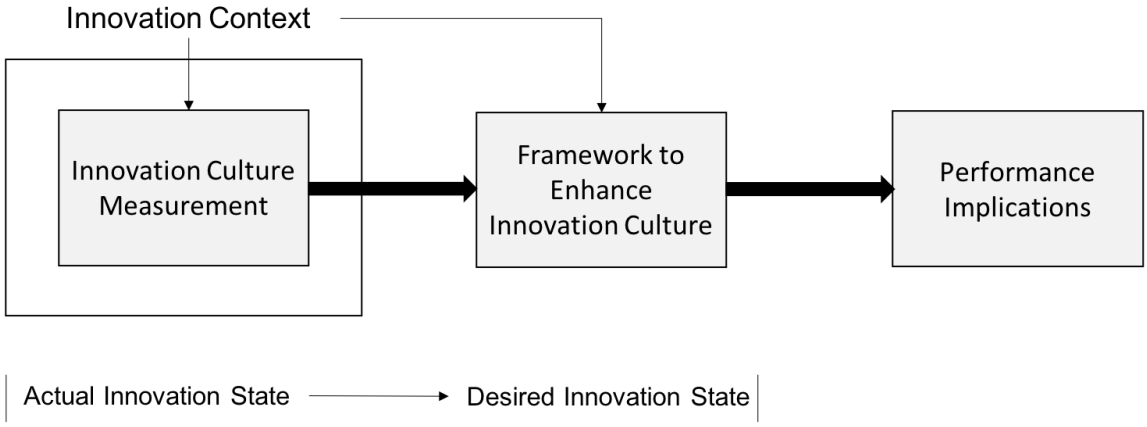

Fig. 1. Innovation Scope of Inquiry

2.2 Innovation and Performance

Academic research in addition to large global consulting firm studies suggest increasing the innovative capabilities in organizations will be the linchpin to increasing profitability and growth in organizations, particularly in an era where productive lives of strategy shortens and competitive boundaries blur. These studies suggest that innovation management has potential to improve growth and profits. A study by Arthur D. Little (Thuriaux-Aleman et al., 2013) concluded the top quartile innovation performers obtain a 13% higher profit than the average performers. A

similar consulting firm study found organizations with significant alignment between their core business and innovation strategies outperform their competitors. The study noted a 40% higher operating income growth over a three-year period and 100% higher shareholder return (Jaruzelski et al., 2014). The association between innovation and performance has also been reported by academics in a breadth of studies (Calantone et al., 2002; Cooper, 2000; Klomp and van Leeuwen, 2001; Li and Calantone, 1998). An innovation – performance study more closely aligned to this research is (Dobni 2011) which surmised that an innovation orientation is related to organizational performance overall. The research concluded that high innovating firms had a positive relationship with the top line growth, customer satisfaction, bottom line growth, and profitability. Alternatively, organizations possessing low innovation orientations had significant negative correlations with return on investment, overall firm performance and the overall enterprise value (Dobni and Klassen, 2015).

(Audretsch 1995) found that new entrant firms that survived in highly innovative industries outperformed other industry players. New firms that were not able to adapt had a significantly lower rate of survival. Knowledge management capabilities, a key driver of the innovation model in this research, allows resources to be used more efficiently which leads to enhanced innovation and performance (Darroch, 2005). (Jimenez-Jimenez & Sanz-Valle 2011) found organizational learning and innovation positively impact performance and that organizational learning impacted innovation. Open innovation, through cooperation with and information sourcing from competitors, positively influences innovation performance (Mention and Asikainen, 2012). Similar framing of the literature as it pertains to intellectual capital, innovation and performance, has been researched as well (Mention, 2012).

In the end, although most companies viewed innovation as extremely important, as high as 85%, only 15% of organizations considered themselves to be successful at creating an innovation environment (Thuriaux-Aleman et al., 2013). Creating an innovative environment is predicated on the organizations ability to implement an innovation agenda. Enhanced performance is only realized if an innovation culture is created and sustained.

2.3 Innovation Culture Measurement

Research has been conclusive in establishing the key role culture plays in innovation (Ahmed, 1998; Dobni, 2008; Higgins and Mcallaster, 2002; Jassawalla and Sashittal, 2002; Lau and Ngo, 2004). Organizational culture is defined as the value, beliefs and hidden assumptions members have in common (Cameron and Quinn, 1999; Denison, 1990; Miron et. al, 2004). (Hartman 2006) explains that culture stimulates innovation behaviour and commitment to innovation amongst the employees of organizations.

Two streams of measurement research have developed related to measuring innovation culture. One stream measures culture in a more traditional sense using established culture typology instruments (Kets De Vries and Miller, 1986; Reigle, 2001; Wallach, 1983) and then assessing which types of culture enhance or inhibit innovation. For example, (Valencia et. al 2010) used the Competing Values Framework (Cameron and Quinn, 1999) to determine that ad hocratic (flexible and unstructured) cultures enhance the development of new products and services, whereas hierarchical cultures inhibit product innovation. Another stream of research (Dobni, 2008; Wang

and Ahmed, 2004) argue that the determinants of innovation (e.g. leadership, structure, process, organizational learning) are in fact a proxy of the innovation activity in an organization. The determinants affect employees through socialization and coordination (Chatman and Jehn, 1994; Martens and Terblance, 2003; Valencia et. al, 2010) and therefore a measurement of the determinants provides a view of the organization's innovation culture. Although both streams investigate the relationship between culture and innovation, they do not extend to our inquiry of understanding whether the measurement models can be used as an implementation framework.

2.4 Innovation Context in the Financial Services Industry

The financial service industry provides an excellent field of scholarly investigation because it is continually being subject to changing context. (Ortt & van der Duin 2008) have categorized the context phenomenon related to innovation as contextual innovation (van der Duin et. al, 2014). Early contingency theorists (Burns and Stalker, 1961; Woodward, 1965; Lawrence and Lorsch, 1967; Thompson, 1967), advanced the notion that organizational effectiveness resulted from fitting characteristics of the organizations such as its structure, to the contingencies that impact the situation of the organization (Donaldson, 2001). Aggregation of contingency theory literature in management fields has enabled scholars to piece together general propositions, such as the relationship between size, strategy, external environment, structure, industry and how organizations execute their business through their technology, processes, and management programs (Chenhall, 2003). With respect to this research, context is important as it will impact the organization's innovation culture, as well as their decisions on how to best execute their innovation agendas. Our belief is that measuring innovation culture will allow organizations to assess the current innovation state and then utilize the measurement categories as a framework to achieve the innovation culture desired state. At any rate, choices of implementation tools will ultimately be impacted by context.

Although the definitions of "fintech" are numerous, see (Schueffel, 2016) for a thorough summary, there is a consensus that new technologies have shaped innovation within the financial services industry (Arner et al., 2015) and will continue to be disruptive compelling change in the future (Schneider et al., 2016; Schueffel, 2016). Innovation research in the financial services industry suggests that the innovation framework in this study may be informative to piece together research findings and commentary. Innovation to develop new products and services is critical for financial services organizations (Drew, 1995) but difficult and complex to manage and measure strategically (Ittner et al., 2003). (Akamavi 2005) found significant research gaps in recognizing the importance of customers and supporting operational units in developing new financial services products. (Vermeulen 2004, Vermeulen 2005) identified barriers to product innovation in the financial services industry: functionally departmentalized structures, limited use of development tools, conservative organization culture, constraining information technology, resources, project based work and incentives. These studies add validity to the relevance of the innovation framework used in this research. The barriers identified by (Vermeulen 2004, Vermeulen 2005), new product development (Drew, 1995), and measurement issues (Ittner et al., 2003) are incorporated into the (Dobni 2008) model though the measurement of innovation determinants and the subsequent innovation activities implemented to improve the innovation score. (Gallouj & Savona 2009) suggest an innovation research agenda for service firms that is

more integrative conceptualized around a typology of innovation magnitude (e.g. radical versus incremental innovation). The innovation framework in this study is aligned to this thinking by being comprehensive in the determinants and allowing a measurement discussion to determine whether an organization is pursuing radical innovation (e.g. a 20-25% increase in their innovation score or an incremental 5-10% increase).

To elaborate on the context for the financial services industry we have adapted the current state analysis of (Dobni 2006) illustrated in Figure 2. More recent financial services literature suggests the analysis categories are still relevant in today's financial services industry and in particular, research oriented towards innovation. Deregulation is still an important contextual factor impacting the financial services industry, thus driving the financial services industry to be more innovative (Bos et. al, 2013). (Nejad & Estelami 2012) argue deregulation resulting from the Bank of Modernization Act of 1999 in the United States continues to impact the financial services industry through the expansion of products that insurance firms, banks, and other financial services providers can offer. The rate of new products and services has been increasing as well to the point that the number of new products introduced in the last decade has outpaced new product development over the past century (Fortin and Uncles, 2011).

More informed customers with higher expectations are evident in the financial services sector, however the increasing complexity of product offerings poses challenges for financial service organizations (Estelami, 2009) as well as societal impacts of the new products (Warren, 2008; Richards, 2009). For example, in recent years, innovative products like the mortgage backed securities, exchange traded funds, and derivatives are now commonplace financial instruments available to the mass market. As well, technology as a key component of infrastructure continues to shape the financial services industry (Jones and Critchfield, 2005). The spread of the internet and internet banking poses new challenges for the financial services industry to innovate in a manner that allows their customers to adopt the innovation, which can be particularly challenging in emerging markets (Ozdemir and Trott, 2009). These advancements also provide opportunity to enhance service to existing markets, and reach entirely new markets. Other important financial services topics have been researched such as intellectual property rights (Mention and Bontis, 2013) and open innovation (Schueffel et al., 2015) to name a few. However, as an overview, the categories represented in Figure 2 are relevant in today's financial services environment. As highlighted, the contextual factors not only impact an organization's current innovation measure, but also the choices an organization will make to reach a desired innovation state.

ISSN 2183-0606
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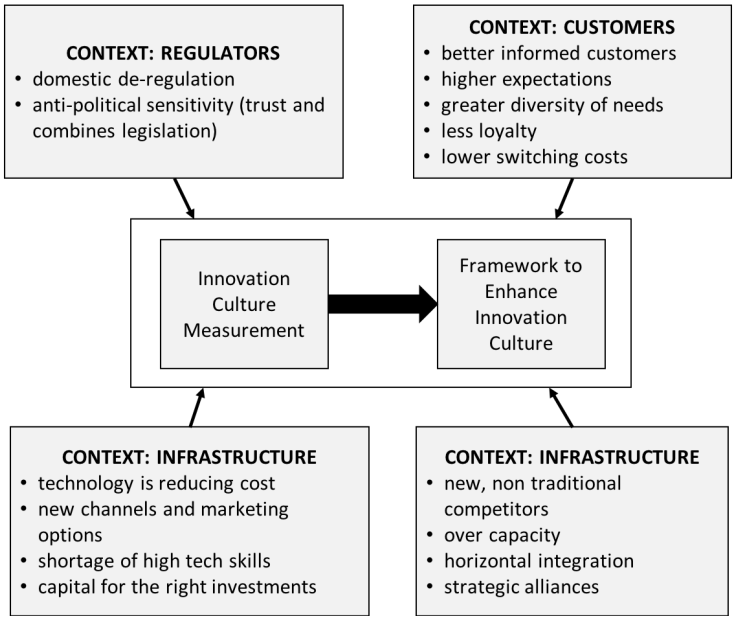

Fig. 2. Financial Services Industry Context (adapted from Dobni, 2006)

3. Research Methods

The research approach involved a case study of a financial services organization. Over a four-year period two separate innovation culture assessments were performed using the Dobni model. The organization's innovation efforts were documented as they utilized the assessment as a framework for implementing their innovation agenda. Given the primary researcher's involvement with the organization in assessing the innovation culture, an action research approach (Lewin, 1946, Coughlan and Coughlan, 2002) was adopted. In a traditional case study methodology, the researcher investigates the phenomenon while trying to limit bias in the research (Yin, 2009). In action research, the researcher works collaboratively (Alder et al., 2003) and is more involved in solving and understanding a problem (Patton, 2002). In this case, the problem of investigation was assessing innovation culture and using the assessment outcomes to implement an innovation agenda. The active approach was primarily contained to the innovation culture assessment, in which several meetings with the senior management team of the organization were held to explain and interpret the results.

The choice of case study subject is an important aspect of qualitative research (Yin, 2009). To align the study with our research intent, the subject needed to be an organization that was consciously deciding to embark on becoming more innovative. Additionally, because the research interest was understanding whether the (Dobni 2008) measurement tool could be used as an implementation framework, the subject organization needed to allow the researchers to survey the company employees multiple times, as well as follow the innovation activities of the company. Ideally, the subject company needed a contextual environment that promoted the need for innovation (e.g. highly competitive or changing industry dynamics). This proved challenging to

actively solicit such candidates. FinanCo approached the lead author after attending presentations and reading publications related to the (Dobni 2008) model. Discussions followed that led to an initial survey instrument measuring the innovation score at FinanCo. The research subject was interested in being able to contribute to scholarly inquiry by allowing further investigation with the forethought of a manuscript that documented their journey. This presented a unique opportunity to perform action research with a research subject that met the needs of the research intent. (Kaplan 1998) espouses the importance of action research to develop new management practices. In many respects the earlier activity based costing and balanced scorecard work of Kaplan with Analog Devices (Kaplan, 1990) followed a similar evolution of research method to the FinanCo project, although other researchers have used action research in the field of innovation (McAdam et al., 2007). Using a single case study allows the researchers to illustrate a conceptual contribution (Siggelkow, 2007) by illustrating how the measurement model can be used as an implementation framework.

From a methodology perspective, the process that followed was a "plan – implement – evaluate" approach (Stringer, 2014). Following the Stringer (2014, p. 9) approach, a series of interactions occurred in a "look-think-act" manner. For example, the researcher would "look" at the survey results, "think" about its meaning in the context of FinanCo s, then "act" through a series of advisory sessions with FinanCo managers. The sessions were both formal in written context or informal discussions. Similarly, when FinanCo was developing implementation actions, feedback was provided from the researcher to FinanCo. Feedback was not in the format of "do this or do that" but more related to interpretation of the survey results and what FinanCo's planned action items could potentially mean in the context of the survey results. These discussions and interactions occurred with the C-suite of FinanCo (president, and VP's of finance, marketing and operations) through a series of meetings, phone calls and workshops. The most extensive interaction occurred between the researcher and the Vice President of Marketing (named Marketsolutions), whom was the chief sponsor. The discussions and interactions with the C-suite led to a series of execution decisions that cascaded into plans and projects throughout the organizations. All functions of the organization were impacted – human resources, finance, operations, marketing and information technology. Thus, began the action research loop of plan – implement – evaluate. The interactions and discussions with the C-suite lead to the initial plans of innovation road-mapping, which were then implemented by a broader team of managers. Checkpoint meetings were held with the C-suite periodically, on average every three to four months, to evaluate progress and adjust plans.

To assess how the research subject used the assessment as an innovation framework the approach was more consistent with traditional case study techniques. A series of semi-structured interviews were performed with senior management to collect information that formed the basis of the research findings. Interview notes were scribed and feedback was obtained to promote internal validity and reduce interpretation gaps of the findings (McKinnon, 1988). Additional information and documentation was obtained from the organization to triangulate the interview findings (Ryan et. al, 2002; Silverman 2001). For example, the organization performed a number of strategy discussions during the implementation period that resulted in action plans and progress reports. These documents were useful in understanding the implementation choices that ultimately evolved. In summary a research protocol of qualitative research using (Yin 2009) and (Nachimias & Nachimias 1987) was used as guidelines, but the bias of action research is

recognized a limitation of the study.

3.1 Choice of Innovation Measurement Model

Figure 1 Expanding on the scope of inquiry outlined in Figure 1, the model used to measure innovation culture for this research was predicated on a widely tested multi-factor approach that displayed high levels of validity and reliability (Dobni, 2008). The factor analysis and final factor solution supports the model of innovation outlined in Figure 3. This model identifies and measures twelve drivers of innovation and is consistent with the literature on innovation determinants (Crossan and Apaydin, 2010). Through factor analysis and repeated testing of the constructs through multiple studies, the original 117 constructs from the 2008 Dobni model were reduced to 58 (Table 1) that were organized around the twelve drivers.

The four innovation dimensions (leadership, resources, knowledge management and process) conceptualize the innovation implementation framework. For example, the importance of knowledge management to innovation (Esterhuizen et. al, 2012; Ruggles, 1998; Darroch, 2005) is represented as an innovation dimension for implementation and further refined in the model through the drivers: "Knowledge Generation", "Knowledge Transfer" and "Knowledge Decision Making." In this regard, the innovation culture assessment model not only analyzes the capabilities of the organization towards knowledge management but further informs the organization as to what aspects of knowledge management are strong (or weak) for implementation considerations.

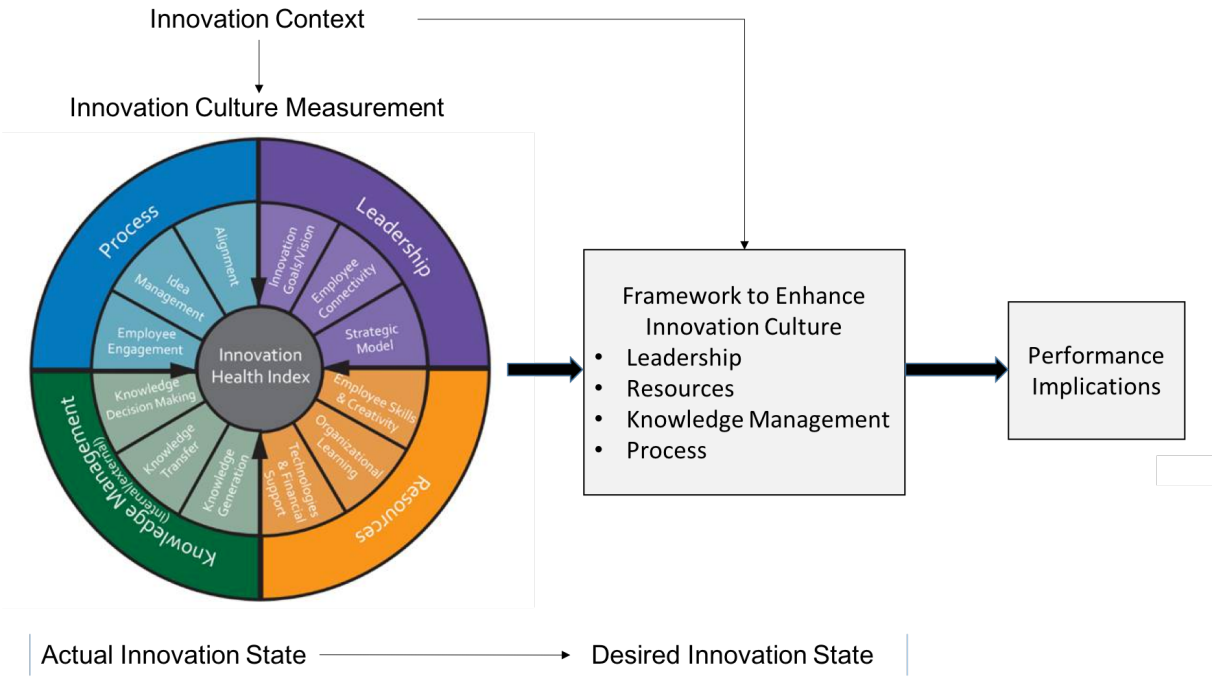

Fig. 3. Innovation Culture Measurement Model building on the Innovation Health Index (Dobni 2018)

Each of the 12 drivers are comprised of a series of constructs developed to quantitatively measure culture supporting the driver. A seven-point Likert scale was used to measure each of the con-

structs, and then the score was converted to a percentage scale (out of 100). The driver scores are the average of the construct scores within each driver. The dimension scores (i.e. leadership, resources) are an average of the driver scores, and the overall score – the 'Innovation Health Index' – is an average of the 4 dimensions. Given the holistic nature of the model, they are considered equally important, meaning none of the drivers are weighted more or less. Each of the 12 drivers are briefly defined in Table 1 below. Although these drivers have been reported in a previous publication (Dobni and Klassen, 2015) given the importance of this knowledge to understanding the context in support of an implementation framework, we have made the decision to re-introduce them herein.

Table 1. Innovation Drivers (adapted from Dobni and Klassen, 2015)

IMPLEMENTATION FRAMEWORK DIMENSION: LEADERSHIP	
Innovation Driver	Explanation
Innovation Goals/Vision (4 constructs)	The degree to which the organization has formally established – within their business model – vision and values to develop and sustain innovation. This is communicated through vision, goals, and objectives that are operationalized through the business model and business processes, and strongly adopted by the senior leadership team.
Employee Connectivity (4 constructs)	This involves how employees think of themselves vis-a-vis their colleagues. For example, do they feel that they can contribute? Do they feel valued and equitably treated? Do they trust and respect management? Do they resonate with what the organization is doing, and are they working together to achieve the vision?
Strategic Model (7 constructs)	Infrastructure for the purposes of innovation involves the business model employed to support the strategy process and innovation overall.
IMPLEMENTATION FRAMEWORK DIMENSION: RESOURCES	
Employee Skills and Creativity (5 constructs)	The extent to which employees have the skills to be innovative. This includes levels of personal creativity and the surrounding environment (time and space) to allow their skills and creativity to be utilized.
Organizational Learning (4 constructs)	Properly tooling employees involves committed education and training programs that focus on developing processes that facilitate the learning of new behaviors, and then post training reinforcement.
Technical and Financial Support (3 constructs)	The extent to which the organization provides resources (financial, time, people, other) to support innovation initiatives.
IMPLEMENTATION FRAMEWORK DIMENSION: KNOWLEDGE MANAGEMENT	
Knowledge Generation (5 constructs)	The environment to support knowledge generation by employees from all stakeholders of the company including industry and organizational value chain knowledge.

Knowledge Dissemination (5 constructs)	The environment to support the dissemination of knowledge to the right people on a timely basis.
Knowledge Decision Making (6 constructs)	The ability of employees, based on knowledge generation and dissemination, to understand the dynamics of their business environment in efforts to define value-added projects and initiatives. These advantages are identified by observing and understanding the industry, competitors and stakeholders, emerging technology, channels, knowledge flows, and future cluster development.

IMPLEMENTATION FRAMEWORK DIMENSION: PROCESS	
Employee Empowerment (5 constructs)	This involves the psychological empowerment of employees and their perceived ability/confidence to undertake autonomous actions that contribute to value creation.
Idea Management (4 constructs)	This involves the level or degree to which employees can pursue what appear to be opportunities or initiatives with less certainty than they are traditionally comfortable with or for which policies allow for (i.e. entrepreneurial activity).
Alignment (6 constructs)	This is a measure of alignment to support desired innovation-related behaviors. For example, the performance management and management control systems, and the alignment of innovation strategy with the organization's strategy.

4. Analysis and Results

The case study that follows presents FinanCo, an organization within the financial services industry that initially scored low on the innovation culture assessment. As the case study will detail, FinanCo, due to systematic deregulation of a highly competitive and regulated business environment, needed to innovate or face extreme negative performance consequences. Over the period of 4 years, through systematic management of an innovation agenda, FinanCo increased their aggregate score by 17% (from 61% to 78%).

Today FinanCo is a successful organization that has re-invented itself through its pursuit of, and focus on innovation. The case study details their journey including the implementation activities that FinanCo executed to improve their innovation culture. Senior management used the innovation assessment metric to guide the choice and timing of implementation activities with the basic philosophy that if FinanCo became more innovative and strategic, financial performance would improve and the organization would prosper.

4.1 FinanCo Background

FinanCo is a financial organization that can be described as a services portal for downstream financial institutions. At the time, FinanCo was owned by over 40 financial institutions in Canada, and they provided all types of services to its member organizations, ranging from a banking system platform, to products and services for clients, to governance and compliance

services for the system. Before the innovation program, the primary mandate of FinanCo was to offer deposit, loan, and compliance services for the member institutions.

The financial institutions in Canada are structured as typical banks, lending money to, and receiving deposits from individuals and businesses. As indicated, FinanCo provided other services to member institutions such as marketing, human resources and strategic advice, and marketable services. Up and until 2000, their basic deposit/loan business model served them well. In the 2000's the environment began to change. Legislation was passed that supported deregulation. This resulted in increased competition in the financial industry as "non-traditional" banks and the internet banking business models entered the industry, and products and services portfolios expanded into investments, insurance services, and financial planning. Margins began to decrease for financial institutions and in response, many smaller financial institutions began merging to leverage economies of scale, as well as to enhance their lending capability and product offerings. As the mergers continued, two fundamental impacts affected FinanCo. As the merged financial institutions grew in size and scope, some of these larger financial institutions could perform the traditional services that FinanCo was providing, essentially creating competition from within.

Secondly, financial institutions were demanding new services to address competency gaps and create new value for competitive purposes. In some cases, FinanCo may have offered the services (e.g. basic marketing consulting advice or new investment products), but FinanCo was not able to deal with the demand or complexity of the products and services demanded, nor did they have the volume to provide services at competitive rates. The value proposition of FinanCo was quickly eroding, as were profit margins, and member institutions were defecting to more cost-effective and value-added options provided by competitors. FinanCo management decided to use innovation to re-invent their organization in efforts to enhance value for their clients.

4.2 What Was Planned?

FinanCo officers discussed options aimed at renewing their market presence and value proposition. They committed to becoming more innovative, which represented a fundamental beginning. The first step taken by FinanCo was to measure their innovation health index (IHI) in efforts to establish a benchmark, and to utilize the index scores across the drivers to develop an innovation implementation plan. Figure 4 describes the results of the initial innovation culture survey.

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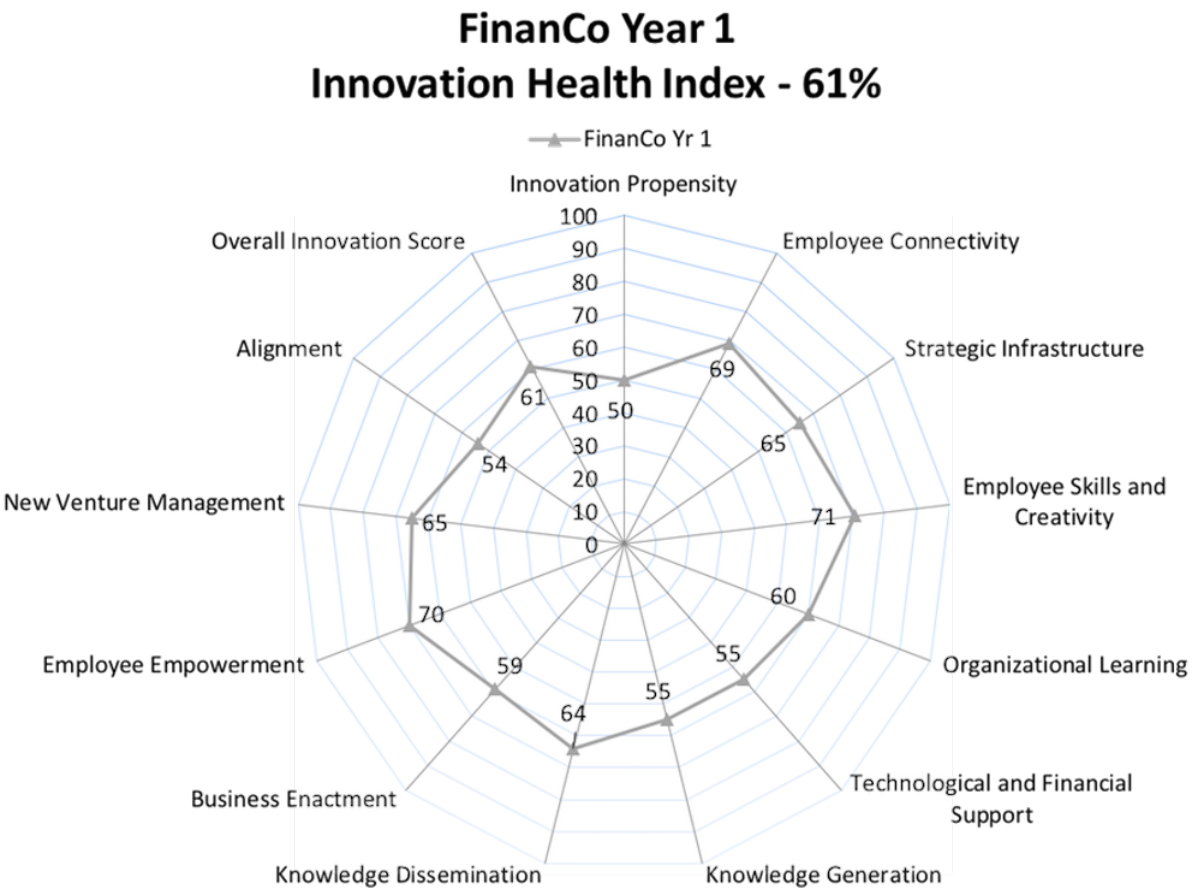

Fig. 4. FinanCo's Initial Innovation Benchmark Score

Initial Conclusions with respect to FinanCo's Innovation. The initial innovation culture score was comparatively low suggesting that FinanCo was not currently innovative. There were issues across-the-board with most of the drivers of innovation, and in particular with their innovation goals and vision (50%), technological and financial support (at 55%), knowledge generation (55%), knowledge decision making (59%), and alignment (at 54%). Through analyzing the individual driver scores and in discussions with management, a number of additional contextual insights were derived. It should be noted that the management discussions were an integral part of the survey analysis given that organizational context plays an important role in innovation. Six conclusions regarding FinanCo's innovation culture were provided:

1. *Innovation at FinanCo was incremental and random:* The low overall score of (Innovation Health Index of 61%) suggested that any innovation occurring at FinanCo at that time was small in scale or incremental. Further, innovation was predominantly a result of a random event as opposed to being systematically managed and encouraged by FinanCo. Part in parcel of this was a lack of governance for innovation. Governance for innovation involves oversight of systems and processes to support innovation. At best, it was largely underdeveloped or non-existent.

2. *A lack of innovation strategy:* Although FinanCo had a mission, vision and strategy, there was an absence of an intent to be innovative throughout the strategic planning process, nor what they had hoped to achieve through innovation over time. In addition, there was no mechanism in place to communicate the strategic importance of innovation to all employees.

3. *Lack of resources to support innovation:* Although the technology and financial resource driver scored low (55%), construct analysis suggested that this issue was more related to inadequate time allowed for innovation and inadequacies in the current technology platform than it was to fund supporting innovation initiatives. Specifically, resources were not formally directed toward innovation initiatives at FinanCo.

4. *Employees at FinanCo were creative:* This was the "tag line" discussed by management as it related to the creativity and empowerment levels of employees. The score of 71% suggested that employee creativity were not barriers to innovation at FinanCo. This driver scored amongst the highest of the twelve measured. Alternatively, the leadership for innovation and organizational design, and execution frameworks were impeding innovation implementation, which explained the significant gaps in this area.

5. *Creating knowledge did not convert into better decisions respecting innovation:* There was a significant difference between FinanCo's ability to generate knowledge and FinanCo's ability to disseminate knowledge, and subsequently use that knowledge to make value-added decisions. Specifically, the scores in the dimension of knowledge management (average of 59%) highlighted that fact that the organization was unable to transform knowledge into innovation projects and initiatives.

6. *Performance measurement and management did not support innovation:* The assessment revealed that there was weak process architecture to cascade innovation goals and strategic information throughout FinanCo. Management control and performance management systems supporting innovation were either lacking or non-existent, and compensatory and incentive structures were misaligned. This dimension scored an average of 54%.

4.3 What was Acted Upon

After the initial assessment, FinanCo's senior management group developed a four-year plan to implement change. The following section*s outline the implementation activities FinanCo executed. Although there were changes to the plans throughout the four years, the case study describes the major activities that were pursued.

Figure 5 provides a roadmap of how FinanCo implemented innovation change over a four-year period. The roadmap was developed through the researcher's interpretation of the innovation activities. Although the roadmap evolved over the four-year period, Figure 5 represents the general thrust and timing of the implementation activities in respect to the four dimensions of innovation measured.

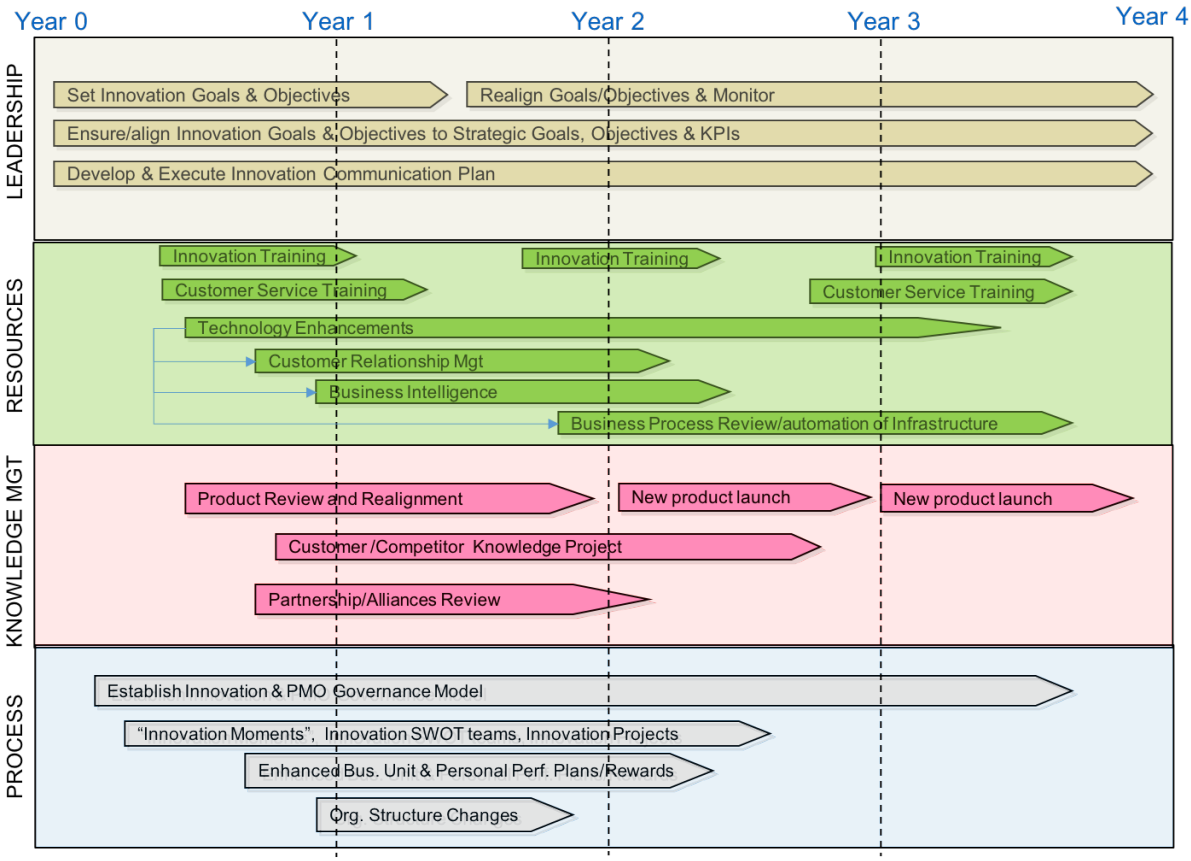

Fig. 5. FinanCo Innovation Implementation Roadmap

The roadmap not only answered the question, "what activities needed to be implemented" but also "the timing of implementation activities." The general principle used in development of the roadmap focused on activities that could be executed quickly and efficiently, and ones that would have maximum impact on the innovation culture for the lowest cost in terms of time and resources. It was thought that 'quick wins' would anchor the innovation culture going forward. In addition, given the low overall score, FinanCo decided that innovation needed to be emphasized across all dimensions of the model. The outcomes of these principles, from a roadmap perspective, explains why FinanCo focused on "leadership" first, followed by activities in the other dimensions. To support the suite of implementation activities, FinanCo was disciplined in using project management techniques to support the implementation effort. The implementation activities for each innovation perspective (leadership, resources, knowledge management and process) are explained below.

General Approaches for Leadership. The foundation of an innovation platform is to launch organizational intent and readiness, and then communicate a commitment to becoming innovative. FinanCo accomplished this by establishing clear innovation goals that both complemented and challenged their current strategy. FinanCo's current strategic process was best described as planned and deliberate. Annually, FinanCo reviewed the strategic goals and amended them as required. By establishing innovation goals, the strategic plan and process became emergent and

fluid. FinanCo was committed to letting the innovation process drive strategic outcomes. The old strategic plan – which utilized a balanced scorecard approach, had basic strategic objectives of profitability and efficiency measured through key financial performance measures. Examples of the innovation goals and objectives were as follows:

- Having a discernable increase in the innovation culture; measured through the innovation health index;
- Enhancing quality and customer service; measured through surveys and process metrics;
- Improving employee engagement and innovativeness; measured through engagement surveys, training metrics and competency analysis;
- Increasing the product portfolio to be more customer oriented; measured through new products launched and key performance indicators to measure success; and,
- Improving the business processes to obtain better information, improve customer service and becoming more efficient; measured by project management metrics of strategic projects.

Almost immediately after establishing the innovation implementation activities, a communications plan was put in motion. Senior management was aggressive in communicating the goals and commitment to innovation. Company-wide communications, internal meetings, online messaging, and visual media were used to raise awareness of the innovation goals and commitment. The basic message to employees was not only to communicate the innovation goals, but also to emphasize that the employees were the people who would be responsible and empowered to achieve the innovation goals. The result was an increase in innovation goals/vision and connectivity drivers as employees began to understand that the organization was committed to innovation and that collectively all employees would participate in realizing innovation goals. Subtly, the strategic model driver was also improving as the strategic thrust changed from a planned strategic outcome to more of an emergent process as employees realized that new product offerings and adapting their business model was critical to success.

General Approaches for Resources. Once the initial focus on context and execution were enacted, FinanCo addressed the resources and orientation dimensions. The drivers that improve innovation on the resources dimension are related to employee skills and creativity, organizational learning and the technical/financial support. Based on the innovation goals and execution activities, it was apparent to FinanCo that skill gaps were present in customer service and general innovation knowledge. There were also major infrastructure process and technology gaps related to customer information, business intelligence and general operational processes that were inefficient. Investments were made in customer service and innovation training and existing training programs were altered to ensure the customer aspect was continually highlighted. Larger information system and process improvement projects were launched to improve customer relationships and business intelligence, including the implementation of a new banking system. These projects were essential to tool FinanCo with the information to launch and monitor customer relevant products and services. They were also essential to provide information to execute other projects recommended by the innovation team, and to provide information to monitor and

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realign the innovation goals in future years. In this respect, the projects improved the innovation culture in the context and execution dimensions.

One of the challenges of major process improvement or technology implementation is change management. The activities FinanCo undertook related to changing employee orientation meant that in general, employees had to become more adaptive to change, and understood the imperative to change. Improving the processes while adopting the new technologies was also easier as employees' innovation propensity and connectivity had begun to improve by the time the technology and process improvement initiatives started.

General Approaches for Knowledge Management. An integral dimension for innovation is knowledge management, where the key drivers of innovation are generating and disseminating knowledge related to the industry, competitors and clients and being able make value added decisions in respect to that knowledge. The technology and process initiatives previously discussed (particularly customer relationship management and business intelligence) provided the basis for knowledge generation. However, two gaps remained, inclusion of information from partners and alliances (open innovation concepts) and developing a process to disseminate knowledge. These two gaps were ultimately closed by initiating a knowledge management project. Communication and reporting processes were developed that included collecting information from external partners and alliances. Through this process, FinanCo ultimately launched new or improved products and services that created better value. New products were launched because of the collective knowledge generated and disseminated. Not only did FinanCo begin to develop more competitive products and services, but also had the right people, processes and technologies in place to support the markedly improved portfolio.

General Approaches for Process. Finally, FinanCo needed to improve its processes directed at the ability to execute initiatives. Prior to deregulation, execution was not as important because the business model and related activities performed by employees were generally stable from year to year. Moving forward, the amount of change required to achieve and sustain innovation goals would require employees to not only embrace change, but also deliver on performing new tasks. From an innovation perspective, execution is achieved through increased employee empowerment and creating a culture where employees embrace new ideas and risk, and have a defined process to implement new ideas. To ensure ideas and empowerment are focused in the right direction, alignment of processes that support innovation is paramount.

To improve execution FinanCo created an innovation team armed with a mandate and budget to achieve the innovation goals at FinanCo. The team was comprised of a cross section* of employees from the organization, ranging from senior managers through to operational employees. Prior to deregulation, senior managers were responsible for achieving goals, the decision-making structure, and the implementation environment. To a certain extent, this did not change. However, the innovation team gave management a new tool to assist in execution and created a culture where employees were more active in decision making and execution, as well as embedding the innovation culture.

The innovation team has a wide-open agenda as it related to 'getting things going'. For example, they developed programs such as "innovation moments," that ensured all working groups in FinanCo were allowed time to "blue sky" ideas to achieve the innovation goals. For specific innovation projects, teams were assembled - similar to a SWAT team, which was given a man-

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date to solve problems or enact opportunities. The innovation team was also responsible for providing direction to innovation projects. In some cases, projects were deemed, "quick wins" and executed immediately and without sanction by the SWAT teams, whereas larger projects such as information system improvements were labeled as a key innovation projects subject to a charter. The innovation team was given the resources to advance these larger projects.

One of the traditional adjustments FinanCo made to their implementation environment was changes to their organization structure. In general, the organizational structure changed to become more customer-centric and aligned with functional areas grouped around product and service offerings as opposed to core functional areas such as finance and human resources – which became support entities within the structure. Similarly, performance management systems changed to accommodate innovation goals and reward employees for ideas, or successful implementation of innovative projects.

4.4 What was the Result?

Did the innovation implementation activities work? To determine this, an additional assessment of their innovation health index was completed using the same assessment metric, at the beginning of year 4 of the initiative. Over this period, FinanCo improved their IHI score by 17% overall; from 61% initially, to 78% at the end of the implementation period. Figure 6 below illustrates the changes in IHI scores over the period of study.

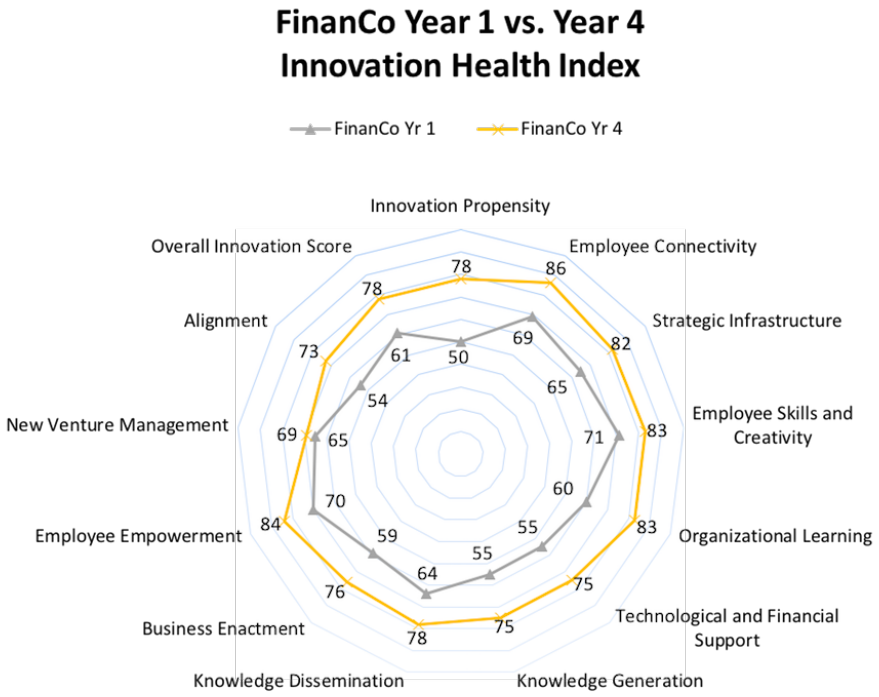

Fig. 6. FinanCo's Year 1 vs. Year 4 Innovation Health Index Score

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Figure 6 outlines some interesting changes over a four-year period. For example, scores across all 12 drivers of innovation increased, with the largest increase coming from the "innovation goals/vision driver." Also noted over time was a more balanced approach to innovation, as the team focused on drivers that needed more emphasis than others (as identified by an interim assessment two years out (measures which indicated variable progress). This customized approach lead to a more efficacious and targeted use of time and resources in support of innovation.

Areas that proved to more difficult to move forward were drivers grouped in the "Knowledge Management" dimension and the "Process" dimension. This was not surprising given that these cultural dimensions in organizations are often more deeply rooted and difficult to affect over a shorter time horizon. The executive team also noted that innovation became more systematic and planned, and that employees better understood how their actions and behaviors correlated with innovation. This was not the case initially where it was evident that innovation efforts at FinanCo were random and sporadic.

Lastly, management also reported that the strategy process itself become more articulate and smoother – from strategy formulation through to strategy implementation. This theme of better execution of existing strategy was not a surprise and is consistent with findings related to the relationship between innovation culture and positioning and performance outcomes. In addition, there were two other proxies of success. At the end of the 5-year period, FinanCo reported their highest net income in history, and the organization was awarded the "top 100 workplaces in Canada" by Canada's premiere news outlet, the Globe and Mail. The case study suggests that FinanCo was successful in advancing their innovation culture through a multi-pronged implementation effort. Consistent with our innovation implementation model (Figure 1), the case study suggests that enhanced innovation culture was a contributing factor to superior performance at FinanCo.

5. Discussion of Findings

The importance of innovation is generally well accepted by managers, practitioners and academics. However, implementing an innovation agenda is difficult and although many organizations have good intentions, this may not be enough. The contribution of this research was to understand if the innovation cultural assessment model could be utilized as a framework to assist financial services organizations in making decisions with respect to implementing their innovation activities given the context specific to their organization. The FinanCo case study illustrates that the model is useful to assess the current state, and guide decisions on implementing change in support of an innovation culture. This informs academic innovation research overall and within the financial services industry as well as managers concerned with implementing activities to implement innovation change. The findings in this case study illustrate that the (Dobni 2008) model, when used as an innovation culture assessment measure then an innovation implementation framework, is informative to academics and managers.

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5.1 Academic Considerations

Our study contributes to the growing research that investigates the linkage between innovation culture, strategy and performance (Naranjo Valencia et al. 2010, Aas and Pedersen, 2011; Christensen and Raynor, 2003; Govindarajan and Trimble, 2005). The case study provides additional support for the notion of complex and multi-dimensional aspects of both innovation and culture. The primary value of this research to academic literature is the framing of the measurement tool to an implementation framework. Our view is this provides a more holistic approach to researching innovation and therefore allows previous research to connect though the innovation implementation framework. For example, our research echoed (Darroch 2005) research on knowledge management capabilities and innovation performance by illustrating the FinanCo's knowledge management activities. However, our case study also shows that the knowledge management activities are bound to a portfolio of activities in knowledge management as well as activities in leadership, process and resources. Similarly, our case study supported the findings of (Jimenez-Jimenez & Sanz-Valle 2011) of organizational learning positively impacting innovation and performance. In the case study, innovation training was a key aspect of advancing the innovation agenda. However, the implementation framework, through the case study, also highlighted relationships with organizational learning and the resources committed to innovation, leadership and a process to govern innovative ideas. Previous research was also supported in leadership (Mumford and Licuanan, 2004; Crossland and Hambrick, 2007, organizational structure (Damanpour, 1991; West et al., 1998, and learning and knowledge management tools (Crossan et al., 1999; Alexy et al., 2013). However, our case study found additional context and innovation implementation activities that were informatively explained though the measurement and implementation framework. The framework can be useful to academics to ensure context and multiple aspects of innovation are considered. The findings are similar to the contextual innovation views (Ortt & van der Duin, 2008; Van der Duin et al., 2014) and support a contingency theory (Chenhall, 2003; Burns and Stalker, 1961; Woodward,1965; Lawrence and Lorsch, 1967) orientation.

We found notable evidence that innovation was integral to the aspects of the financial services, supporting our literature review and case study subject choice. Previous financial services research findings in regulation issues (Bos et al., 2013; Nejad & Estalami, 2012) and product development (Estelami, 2009; Jones and Critchfield, 2005) were very apparent in the case study analysis. However, our case study illustrated that an implementation framework addresses issues raised in previous financial services innovation literature. For example, the case study illustrates how the implementation framework was used to create an action plan that addressed many of the innovation barriers raised by (Vermeulen 2004, Vermeulen 2005). The concept of Fintech as described by (Schueffel 2016) seemed to be an appropriate contextual description for FinanCo, and there is little reason to doubt this will not continue, further highlighting the need for innovation implementation frameworks. Newer technologies such as blockchain, internet of things and artificial intelligence, although not formally analyzed in this case study, will undoubtedly shape innovation discussions and plans in the financial services sector.

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5.2 Management Considerations

Over the course of working with others and with FinanCo dating back nearly 15 years, we have gained many valuable insights that we believe have a common theme as it relates to advancing innovation in financial services organizations specifically and other organizations in general. Through other research (Dobni and Klassen, 2015), our content analysis discovered successful traits and themes as identified by senior executives. These were brought to light in the FinanCo case, and we have made the linkages below were possible:

1. The organization must be committed to institutionalizing innovation as a core strategy rather than using the term ubiquitously. The presence of a clear 'innovation strategy' will signal the importance of innovation to the organization. FinanCo's greatest gains over the 4-year period was resident in the driver of 'innovation goals/vision.' This was not a surprise as they expended a great deal of time and effort to establish this foundation.

2. Innovation culture should be measured so that an organization can establish a baseline of their current innovation state and for the purposes to measure and monitor improvement over time. The initial assessment at FinanCo helped to establish a targeted roadmap to support innovation culture change.

3. It will take years, not months, to embed sustainable change in the organization's innovation culture. Therefore, organizations need to have a medium to long-term agenda, as well as be persistent in the pursuit of advanced innovation cultures. For FinanCo, this process unfolded over a four-year period, and continues today as innovation became embedded in their culture.

4. Innovation can appear complex for organizations, so it is important to develop a simple governance approach to innovation that allows for the progression of ideas from initial stimulus through to implementation. Early and inexpensive wins are essential in reinforcing the innovation program. The establishment and formal recognition of the 'innovation team' at FinanCo proved to be a body that provided fuel and sustained momentum. It was also beneficial that a significant number of employees were engaged in innovation activities directly or by supporting others. Noteworthy to this is the fact that all employees at FinanCo were surveyed at all intervals. This proved to be an avenue for employees to provide further input into the process – such as the identification of barriers to innovation, and input into improving the innovation process overall.

5. Resources, time and space need to be dedicated to support innovation agendas. We have encountered situations where innovation is used loosely and programs ran from 'the side of a desk.' These thrusts will ultimately result in false starts and failed initiatives. Dedicated support mechanisms and resources (human and financial) need to exist in efforts to encourage the use of a consistent innovation process. Examples include tools and processes, internal champions, teams or experts, formal training programs, and a targeted innovation fund to name a few. FinanCo set aside employee time and committed an innovation fund specifically dedicated toward innovation. This fund eventually became a formalized budget item.

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6. It is important that a system not only needs to be in place to capture knowledge, but to effectively communicate and disseminate knowledge to the point that information can be used by employees for decision making support as it concerns innovation. FinanCo undertook a communications audit with the objective to clarify and integrate information assets such as databases, policies, procedures, and communication flows with the decision-making models.

7. Finally, the support for innovation behaviors of employees must be embedded in the performance management system. At FinanCo, innovation goals became part of the individual employee performance plan. Employees were then formally evaluated and rewarded in respect to achievement of these goals. Management was also cognizant to engage in informal acknowledgements such as recognition and other non-compensatory rewards.

6. Conclusion

The role of innovation is becoming increasingly more important in organizations today. Management is beginning to realize that innovation creates long-lasting advantages and produces dramatic shifts in competitive positioning. Successful implementation of innovation activities will lead to an innovative culture. This in turn can provide a competitive advantage and industry leading performance.

Generalization of a single case study to a larger population is difficult and given the uniqueness and context of financial service organizations, we would not suggest that FinanCo's experience could be generalized across an industry. Further research on using the (Dobni 2008) model as an innovation implementation framework in other case study settings across multiple industries would enhance validity. Given the action oriented nature of the research method, the experience of the authors and familiarity with the measurement tool certainly provided added judgement to FinanCo that independent users may not have. Further replication of the study, by researchers and organizations less familiar with the measurement tool and framework would also enhance validity. One of the limitations and an area that needs to be advanced is the relationship between the determinants within the measurement model and implementation framework. One of the most basic questions asked by management is, "What should we do first?" This is not an easy answer, but could be advanced through empirical work on the relationship between the innovation drivers in the (Dobni 2008) model.

What we have learned from this action research case study is that pursuing an innovation culture can be accomplished on a systematic and planned basis. Initially, organizations can benefit the most from are investments in leadership, and initializing discussions around innovation. It is important are not only creative but also empowered. Economic and competitive issues are not treated solely as obstacles, but rather an imperative for innovative change. It is a challenging environment, and the key question becomes one of how C-suite executives should focus their limited time and resources on a handful of key drivers that support innovation. CEO's that get it have already communicated a strong case for change, obtained senior leadership resolve, and have strategically analyzed the innovation activity choices to execute innovation through an integrated approach.

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ISSN 2183-0606
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ISSN 2183-0606
http://www.open-jim.org

Journal of Innovation Management
JIM 6, 1 (2018) 111-134
HANDLE: http://hdl.handle.net/10216/111571
SM: Nov/2017 AM: Apr/2018

Business model and innovation orientations in manufacturing SMEs: An Australian multi-case study

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Abstract. Research studies of SME innovation practice observe some common themes, such as an orientation towards networking, and some differences that may seem activity-related (e.g. production or service). In this paper we suggest the kinds of innovation activity undertaken by an SME will depend on their dominant business model and owner/enterprise attitudes, each one being moderated by purposeful networking. This is illustrated in our review of data from 50 case studies, where combining a CEO narrative analysis with secondary data on the nature of the firm has identified seven generic manufacturing business models. We observe these may be adopted singly or in combination to pursue a competitive advantage, and the dominant business model may change over time as new capabilities are developed and/or in response to market changes.

Keywords. Innovation; Business Model; Networks; Manufacturing; SMEs; Discontinuous Innovation.

Cite paper as: Beckett, R., Chapman, R. (2018). Business model and innovation orientations in manufacturing SMEs: An Australian multi-case study, *Journal of Innovation Management*, www.open-jim.org, 6(1), 111-134. http://hdl.handle.net/10216/111571

ISSN 2183-0606
http://www.open-jim.org

1 Introduction

Traditional studies of innovation often consider SMEs as a homogenous group, or may cluster them by traditional industry sector (like services, manufacturing, agriculture). On the one hand, due to their relatively small size, SMEs may be seen as more flexible than large firms, but on the other hand their limited resources may restrict their innovation activities. Our shared history of multiple sector SME involvement (both as practitioners and researchers) indicated there were differences between individual SMEs of similar size in a given industry sector. They seemed to prioritize innovative activities differently and define innovation in different ways. The question was, what might be the sources of this apparent diversity?

As firms identify different ways to compete, traditional sector classifications become blurred. An example is the notion of *servitization*, which may be defined as 'the innovation of an organization's capabilities and processes to better create mutual value through a shift from selling product to selling Product-Service Systems' (e.g. Visnjic & Neely, 2011; Neely et al, 2011). Was our informally observed diversity related to the adoption of different business models?

The Oslo Manual (2005), which is used to shape a variety of large-scale innovation surveys, defines innovation as "the implementation of a new or significantly improved product (good, or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations. Was our informally observed diversity related to different SMEs focusing on different forms of innovation?

In many parts of the world SMEs are regarded as the engine of regional growth, and there are efforts to stimulate SME innovation. But without an understanding of SME innovation dynamics, such efforts may not be successful. For example, in adapting to changing market and technology conditions, individual SMEs may need different kinds of support at different times, may not have the time or resources to access government initiatives, or there may be a mismatch between the timing of access to such initiatives and when a particular SME needs particular support.

The research question to be explored is: *how might SME innovation dynamics be characterized?* The paper starts with some observations from the literature related to SME innovation, which leads to three hypotheses. Multiple case studies are explored in the context of each hypothesis, and some conclusions are drawn, offering insights into the underlying dynamics of SME innovation that complement current views expressed in the literature. Some opportunities for further research are suggested.

2 Some Observations from the Literature

Consistent with our informal observations, a study of Italian SMEs by Massa and Testa (2008) found there was a higher level of innovation than institutional survey data suggested, and this was linked to how innovation might be defined. Did the survey ask the right questions? The entrepreneurs' perspective saw the process of innovation as 'anything that helped to make money', whilst policy-makers saw SME innovation as 'dream and risk'. It was suggested that academics gave greater importance to the definition of innovation. It was also suggested that these different views could lead to divergent stakeholder goals and contrasting opinions on effective support

ISSN 2183-0606
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policies. The SMEs interviewed by Massa and Testa stressed that innovation sources are multifaceted, internal and external (involving customers, suppliers and consultants), and not just driven by new technology. These authors also noted the influence of regional networking as an important driver of innovation within the SMEs considered.

2.1 The Centrality of Networking

Kickul and Gundry (2002) surveyed 107 US Midwestern small business owners to explore potential linkages between the strategic orientation of the firm and its influence on innovation practice. Analysis of the responses suggested that a small business owner's proactive personality is linked to a strategic orientation for the small firm. Employing a prospector networking strategy influenced the goals and direction of their organizations and the types of innovations developed and implemented.

Another study of 500 SMEs across six European countries found that proactive relationships with suppliers, users and customers facilitated innovation, and that more consistent new product development outcomes were observed in those having links with laboratories and research institutes (Lasagni, 2012). Lewrick et al (2007) asked some 200 technology-driven innovative company managers around the Munich area about the nature and value of their networking activities, In broad terms, personal networking seemed more important to young firms, whilst formal collaborations were more important to mature firms.

Camarinha-Matos, Afsarmanesh and Ollus (2005) reported the findings of a multinational team of researchers working on the ECOLEAD project. The project drew on lessons learned over more than a decade from a multitude of collaboration initiatives. One outcome was a sixty-four page document (Camarinha-Matos et al, 2007) detailing a reference framework relating to the establishment and operation of collaborative ventures. It was noted that collaborations may be established for long-term strategic purposes or to achieve a shorter-term goal. It was also noted that the term 'collaboration' was used in a number of diferente contexts ranging from informal networking through conditional cooperation to full and transparent knowledge-sharing collaboration. The point we wish to make here is that regardless of the extent of collaboration being considered, it was observed that networking involving communication and information exchange was a foundation activity

Gilmore, Carson and Grant (2001) explored how SMEs used networking in their marketing activities. They noted the practices adopted may be determined by some attributes of the entrepreneur or owner/manager; and may beinfluenced by the size and stage of development of the firm. They linked networking and learning that influenced decision-making, observing that as networking activities moved between personal and business relationships, so did the nature of decision-making. Social networking might only provide partial information, and call for the use of intuition. Business contacts and networking could inform more rigorous decision-making. Saunders et al (2014) researched the role of networks in supporting SME learning, noting the need for opportunities and time for reflection as a means of stimulating personal learning and that time spent engaging in informal conversations with peers be considered as an investment not a cost.

O'Donnell (2014) interviewed 30 small firm owner-managers in Ireland to explore the nature of

networking undertaken and how networking influenced marketing outcomes. It was found that networking could have a multitude of facets. Sixteen contributions were identified, including access to new knowledge of various kinds, and the identification of new cooperation and market access possibilities. Different connections were made with different people at different times to understand the firms' external business environment and formulate or change marketing plans. Some activities sought feedback on the firm's competitive position, some sought to identify new opportunities, some sought to identify new practices.

Ceci and Iubatti (2012) explored the role of personal relationships formed in SME networks in facilitating innovation diffusion. They suggested that the co-existance of personal and professional relationships modified inter-firm dynamics, creating a space where traditional innovation activities could take place in an unusual way.

Alguezaui and Filieri (2010) have observed that different kinds of social networks support different aspects of innovation. Sparse networks support the 'fuzzy front end' knowledge sharing and incremental innovation, whilst dense networks having strong interdependencies better support radical innovation. Whilst an SME firm may be established to commercialise a radical idea, once established such firms may need to pursue incremental innovation on many fronts.

In summary, these observations introduce the concept of purposeful networking as a strategic mindset where two-way personal exchanges of information may enhance competitive positioning or where such exchanges may lead to cooperative working arrangements. In an innovation context, purposeful networking may identify an incentive to innovate, identify new ideas, or at other times be used to test ideas. Networking is generally seen as important, but is undertaken in different ways and for different purposes at different times. It takes time, but the benefits accrued include obtaining leverage from new ideas and enhancing the absorptive capacity of the firm (Konsti-Laakso et al, 2012)

2.2 Innovation is Personal

Organizations may seek out innovative ideas, but if there are no champions, if no-one takes ownership of a particular idea, innovation does not happen. In addition to the idea champion, there must be champions of the innovation process, providing linkages as the idea progresses, and there must be management champions that support the innovator and provide resources (Unsworth, Mazzarol and Reboud, 2009; Coakes and Smith, 2007; Vincent, 2005; Kelley and Lee, 2010).

In a study of 360 UK SMEs Blackburn et al (2007) found that owner-managers who saw themselves as innovators or change agents were more likely to stimulate growth, but the size (larger) and age (maturity) of the firm had a stronger influence.

Terziovski (2010) analysed survey data from 600 Australian manufacturing SMEs. He observed the innovation processes within small firms seemed to be more organic than their larger counterparts, and suggested their performance may improve if they mirrored large firm practice. This seems consistent with Australian Bureau of Statistics data showing level of innovation activity in Australian firms generally increases with firm size.

Hickman and Raia (2002) observed that both divergent thinking and convergent thinking styles are necessary for successful innovation. Without some divergent thinking an organisation will

lack the creativity and passion required to make breakthrough innovations; and without some convergent approaches the organisation will lack the perception and persistence to realize the potential of their innovative ideas.

A study of 256 Scottish firms by Chang, Hughes and Hotho (2011) suggested that SMEs develop a capability to dynamically balance divergence and convergence in mediating between internal organisation and external environmental conditions. The implication is that sometimes SMEs may focus on seeking new ideas, and sometimes on deploying innovative ideas.

In summary, what we take from this is that in firms of all size, someone needs to take ownership of an innovative idea. But to facilitate its deployment, it is necessary appreciate what is required at different stages and to orchestrate the activities of a variety of actors as an innovation evolves, which requires distinct capabilities and skills (Ritala, Armila and Blomqvist, 2009).

2.3 Business Models and Innovation

Implementing an innovation has to make business sense. Chesborough (2010) suggests: 'a mediocre technology pursued within a great business model may be more valuable than a great technology exploited via a mediocre business model' (p354). Teece (2010, p 179) describes the concept of a business model as follows:

A business model articulates the logic and provides data and other evidence that demonstrates how a business creates and delivers value to customers. It also outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value. Companies can adopt business models pioneered in one space into another.

In reviewing the extensive literature on business models, Mason and Spring (2011) found that the three key elements consistently identified as the fundamental components of business models are: 1) the technology (or technologies) that make up the product/service offering, its delivery and management; 2) the market offering (what is actually offered to the customer and how this is done); and 3) the network architecture (the configuration of buyers and suppliers that make the market possible). The third component has been somewhat overlooked by some sections of the business model literature, where a firm-level strategic focus has dominated research on the business model concept. Other authors (Loss and Crave, 2011) have extended business model constructs to include dynamic alliances between firms, referred to earlier as collaborative networks.

Zott and Amit (2010) suggest that the purposeful weaving together of interdependent activities - those performed by the firm itself or by its suppliers, partners and/or customers - is the essence of the business model design. Osterwalder and Pigneur (2009) have observed that for many firms, a business model may be so embedded in routine activities, it has to be brought to the surface and mapped out to clarify the constituent parts and how they are related. It is integral with day-to-day operations and there may be a dominant model in a particular sector (e.g. manufacturing or service). These authors have developed an approach called the business model canvas to develop a picture of just how a firm's business model is constructed. Major constructs are the value proposition, infrastructure, customers and finances.

A concept diagram drawing together several elements from business model research that may be used to investigate and analyse both manufacturing and service business models is presented

in Figure 1. Many business model representations are oriented towards good-producing firms. However as noted by Kastelli et al (2013), firms pursuing a servitization strategy need to rethink their business models. Both these authors and Maglio and Spohrer (2013) cite the utility of service blueprinting in understanding a services-oriented view. This concept considers activities as front-of-stage or backstage (Bitner, Ostrom and Morgan, 2008). Figure 1 retains the concepts of value proposition and market engagement found in the business model literature, adding expectations to be met in such engagement. The market perspective is modified slightly by referring to beneficiaries. This reflects our experience that the immediate customer of a firm may not be the end beneficiary, and this has to be taken into account. An example is where the direct customer is the purchasing department of a large organization, representing the end users. Here relationship building with both the direct buyer and the end user may be beneficial as a kind of 'front office' activity. However the creation and delivery of customer value is supported by back office infrastructure in carrying out tasks to met specific requirements. The financial arrangements referred to in the business model literature generally consider ways of building revenue and constraining costs. It is our observation that, particularly in collaborative environments, the equitable distribution of margins amongst partners also needs to be considered, as does return on investment by each participant. The authors have previously used this model with several different groups of SME managers to discuss concepts relating to business model operation and innovation.

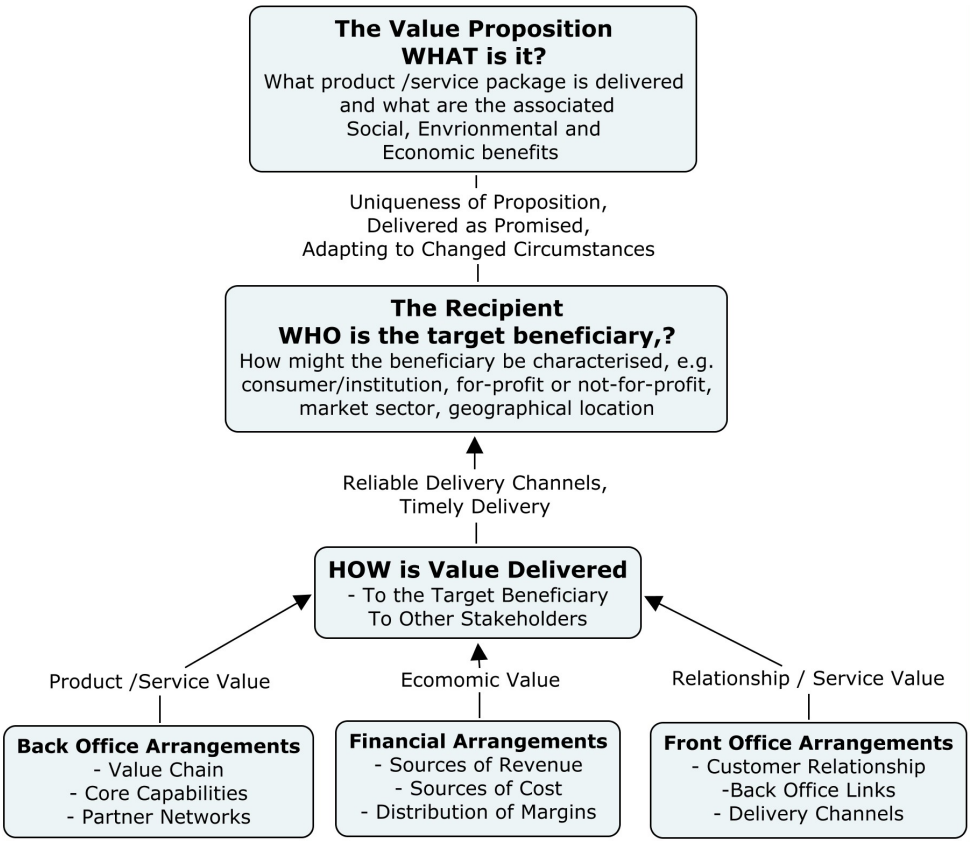

Fig. 1. Business Model Analysis Plan

Sabatier et al (2010) drew on an analogy between the business model concept and a recipe. They suggest a firm may have more than one 'recipe' at their disposal to enable the establishment of a complementary set like a multi-course 'dinner'. The biotechnology firms they studied over a period of ten years commonly used two or three of these in concert, where the choice seemed to relate to the firms risk appetite and acceptance of interdependencies on other firms. Barjack et al (2013) reviewed 67 case studies of enterprise Business Model Innovation from Europe, the USA and Asia. These authors then clustered the 67 cases into three families where the first two were perceived as representing more radical innovation activity, and the third, more incremental or architectural innovation activities:

1. *All-round goods innovators*: with a focus on new products (and less on services); with associated process and market innovations, but with revenue models remaining unchanged.
2. *Revenue model innovators:* with a focus on service and product pricing innovations and revenue model changes, but very little product innovation. This is observed in many e-commerce arrangements
3. *Small-scale innovators:* This largest group in the study mainly introduced new services, with a focus on work arrangements, market channels and support activities.

In summary, the focus is on delivering value to customers and extracting value for the firm, and this may be achieved in a number of ways – there may be different innovation scenarios associated with a particular company at a particular time. If customer expectations change, the business model may also have to change, or a supplementary model be established.

2.4 SME innovation framework conditions

Drawing on the above observations from literature related to SME innovation, and in particular the summaries at the end of sections 2.1 – 2.3, we put forward three propositions

1. *Innovation is predominantly a personal process in such businesses – largely influenced by one or two key entrepreneurial individuals. This 'personal' innovation is largely influenced by prior experience related to dominant business models in the relevant sector, and an ability to orchestrate different innovation processes.*
2. *Both the need to innovate and the scope for innovation are influenced by what is learned through a strategic orientation towards social or organisational networking, recognising that such networking has multiple dimensions. We use the term 'purposeful' networking to represent a mindset and an activity underpinning all such networking that provides benefits to the organization and creates connections beyond the organisation.*
3. *Current and desired competitive positioning, and the role of innovation, is driven by matches between the dominant business model(s) and social/organisational networking observations that sense the extent of fit with the business environment.*

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A framework illustrating the constructs and connections considered in the above propositions and developed from our review of the literature is shown in Figure 2 below.

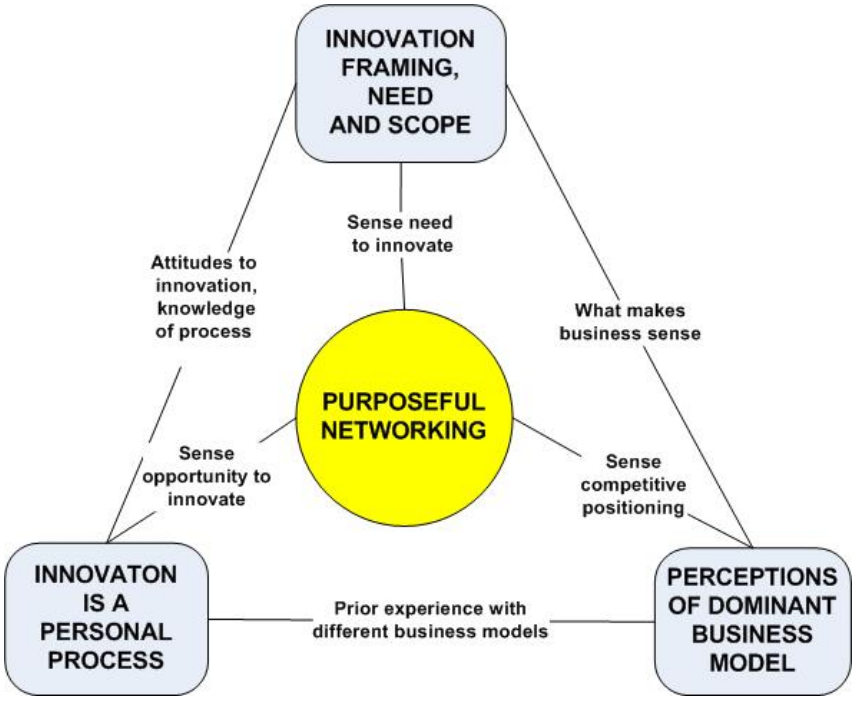

Fig. 2. Conceptual Framework for the Research

3 Research methodology

We wanted to investigate why apparently similar SMEs might assign different priorities to different kinds of innovation and why they might define innovation in different ways. We identified three propositions from our literature survey. We adopted a case study methodology, which according to Yin (2014) is appropriate in exploring questions of how and why. Our unit of study was the individual SME. We drew on case study data available to us where each case involved an exploration of SME innovation practice. We drew on viewpoints from multiple cases as a form of triangulation considering our 'why' questions.

Over the last ten years or so we have accumulated transcripts (generally from CEO interviews) and secondary data related to SME innovation in more than 50 cases. The case study material was collected in connection with four government or industry body programs that sought to share innovation best practice or identify how innovative SMEs could be supported in their efforts. These cases included manufacturers from different sectors plus some firms focused on providing services to manufacturers. Sectors covered included tool-making, packaging, auto components, electronics, shipbuilding, building products, pharmaceuticals and food manufacturing. The case

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study firms had been selected on the basis of their reputation as judged by government or industry association observers who had worked with them.

Case study data was assembled through textual analysis of transcribed interview data and combined with secondary company materials and observational data recorded during company visits. We have reviewed these cases to draw out how the SMEs managers described what they thought was innovative, what they actually did, and what they perceived the dominant business model in their organization. In some case we had longitudinal data available, and could see if firms changed their business model(s) over time. The sources of data are shown in Table 1. All of our case study firms had been in business for more than ten years.

Table 1. Data sources

Data Source	**Data Set**
Transcripts from a 2001 industry workshop on the diffusion of innovation	17 SMEs gave their definitions of innovation and provided examples of how they pursued the process of innovation
A 2008 commissioned study of innovation in the NSW manufacturing sector	There were interviews with CEOs and senior managers of 22 firms. Content analysis of the transcripts showed the dominant themes as money and product, followed by manufacturing, then government.
A 2009 study of five innovative Advanced Manufacturing firms nominated by their industry association.	All 5 firms provided contract manufacturing services, and one had its own product. The SME CEOs and senior managers gave their views of what innovation meant for them.
A 2011-14 study of food sector SMEs	Interview transcripts and secondary data from 11 food sector firms.

As recommended by Eisenhardt (1989) for cross-case analysis studies, we have used a similar classification of the various cases involved in our study. We have used the key business model characteristics as the classifying element (see Table 2 below). Answering the questions posed in the boxes shown in Figure 1 through analysis of the interview transcripts retained from the studies listed in Table 1 allowed an effective classification of the business model constructs adopted in the various firms involved.

We briefly explored what might have changed in our case study firms since we collected the original data. A web search on the 17 firms involved in the 2001 workshop and the 5 firms in the 2009 study showed that: six had been acquired by overseas businesses; four had grown substantially through exports; and some had grown through partnerships or mergers. Most had changed their business models.

4 Findings

The transcripts from the firms were clustered according to what they said they did and applying the analysis framework shown in Figure 1 to the retained transcripts rather than the industry

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sector they operated in. Table 2 shows the outcome: the identification of seven characteristic business models with quotes from representative firms on how they viewed innovation. The seven characteristic business models were: contract manufacturing; technology development; product design and manufacturing; services supporting manufacturing; manufacturing and distribution; product-service bundling; and services.

Table 2. Classifications according to business model type

Type	Characteristic Business Model	Brief description / Representative quote
1	Contract Manufacturing (4 firms)	*Well innovation for me is bringing on the latest technology and using those technologies in a coordinated way to bring in an outcome that provides a competitive advantage to us against our competition*
2	Technology Development (8 firms)	These firms saw technology development as a key to their competitive position, and had a focus on intellectual property. Some of them also manufactured the products they developed, and some developed processes for making their product to offer an IP/tool bundle. *"I think of it in two separate ways. One is a formal way where we use innovation to create intellectual property in the form of patents or trade secrets that we use in our work. At the same time it means trying to do everyday things faster, cheaper and better than our competition throughout the world."*
3	Product Design and Manufacturing (2 firms)	*"I see innovation as not only applying to new ideas, but to the whole process from product design through production through and including the culture of the company - a 'nothing is impossible' attitude. For example most of our competitors are highly vertically integrated whereas we are not. We have turned this into a positive, providing flexibility being able to work with a multitude of suppliers compared with our competitors to design to cost."*
4	Services firms supporting Manuf. (1 firm)	*"For us this means the adaptation of an idea from one industry to another industry. A solution that has been applied somewhere and we see the links between that industry and we can translate that solution. So for us it's not about being revolutionary, but evolutionary."*
5	Manufacturing and Distribution (1 firm)	This firm operated manufacturing and multiple brand retail outlets (selling their own and other firm's products) as separate Divisions. *"The commitment to the steady and gradual improvement in both process and product in response to customer needs"*
6	Product-Service Bundling (1 firm)	*We provide long term leases for commercial carpet covering replacement and maintenance aspects of the floor covering.*

Type	Characteristic Business Model	Brief description / Representative quote
7	Services (5 firms)	*"We are a services organization so we don't necessarily create anything unique from a product perspective however we apply innovation in grouping our services in such a fashion that they differentiate us in the customers eyes. So from our perspective we need to take training or a type of application development presented in a fashion that makes it appealing. We don't do anything different from our competitors, but we show how we can deliver value"*

The five Advanced Manufacturing firms from the 2009 study were all viewed as innovative by their peers. The CEOs of these firms participated in individual structured interviews regarding their definition of innovation, and how it was practiced in their firm. At the time of the original interviews, all provided **contract manufacturing** services, and one had its own product. Their external networking was with customers, through industry associations/networks, trade shows, marketing missions and the internet. Since the original interviews, the global financial crisis had clearly impact on the businesses. One acquired the business of another. All now have a specialized product of their own, albeit acquired by different pathways (acquisition or development). Two of them have added repetitive contract production to their repertoire, and another is specializing in the production of micro-tooling. Those interviewed expressed some different views about the meaning of the word 'innovation' as presented in Table 3. From the broader discussions held with participants it became clear that a culture supporting innovation exists, and that to these firms innovation is a technologically focused process of continual improvement.

Table 3. Definitions of innovation from Advanced Manufacturing Firms

Respondent	Definition of innovation
1	*I don't use the word innovation. And I tell you, the longer governments keep using these 'clicky' words, the real world with which you're dealing here, manufacturers, won't get on board to the degree they perhaps should.*
2	*Well innovation for me is bringing on the latest technology and using those technologies in a coordinated way to bring in an outcome that provides a competitive advantage to us against our competition.*
3	*Trying to look at new technology and new ways of doing things and time saving.*
4	*...if you take the (meaning) straight out of the dictionary it is simply an introduction of change... If you talk about creative change and doing things creatively in your business to get a better business result – and that's the definition of the word innovation. And it's [innovation] a good idea and then turning it into something to make money. In a way, it's also always looking forward with a commercial mind. Innovation for the sake of innovation to me is not innovation. With innovation you have to create wealth somehow.*

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Respondent	Definition of innovation
5	*Innovation is an evolutionary event rather than a new bright spark. Not a revolutionary new idea just improvement...simply trying new things. Innovation doesn't necessarily spell success or good things. It's just a day-to-day thing that you try to implement.*

Many CEOs expressed the view that their own networking was the key driver for innovation in their organization. The following quote from one of these CEOs is typical of this perception.

> *I tend to run my organisation based on past experience and I guess through models I've learned through doing masters degrees and stuff like that...sometimes you just don't know where you get knowledge from to make decisions and I guess its just its just the basis of the experience I've had in life to make those organisational changes.*

Table 4 provides an overview of the approach to innovation taken by a sample of the firms interviewed in the 2008 manufacturing survey illustrating that a variety of forms of innovation and business models may be in play. Note that one of these firms had started to introduce a **Product-Service bundling** business model.

Table 4. Approaches to business and innovation adopted by a selection of the SME CEOs interviewed

Company	Business Description and Approach to Innovation
Carpet Manufacturer	Modular carpet manufacturers with strong environmental sustainability focus. Product innovation, but also business model innovation through "servitization" (providing leases for long term commercial carpet use covering replacement and maintenance aspects of the floor covering).
Robotic Solutions Provider	Experts in tailored automatic and robotic solutions, including design, manufacture, project management through to implementation, commissioning and on-going service and support. Technical product focused, but also service innovation through improved customer responsiveness – providing technology-driven tailored solutions solving specific customer.
Sleep Disorder Product Manufacturer	Developer, manufacturer, and marketer of products for the diagnosis and treatment of sleep-disordered breathing. Product innovation focused on sleep disorder solutions, but also process innovation to improve production efficiencies for their products.
Semiconductors Manufacturer	Designs and manufactures microelectronic devices using unique configurations of semiconductor process technologies. High tech product and process innovation, with a focus on the latter, because much of the new product technology is sourced from Universities of overseas partners. Close connection with several key Universities, and key managers are strongly networked. Defines innovation as "Turning an idea into money."

Company	Business Description and Approach to Innovation
Welding and Engineering Specialist	Welding specialist with strong core competencies in stainless steel, aluminium fabrication & sheet-metal work, plus design, manufacture & installation complex life support systems worldwide. Process innovation, but also some product innovation through adapting existing technologies to provide innovative solutions for customer problems.
Hearing Solutions Provider / Manufacturer	Design, develop, manufacture and market a range of implantable hearing solutions to solve hearing loss. Technology-focused product innovation driven by a large R&D function (about 12% of revenue goes to R&D) but also some process innovation to improve productivity and efficiency of manufacturing processes.
Aerospace Electronics Supplier	A diversified supplier of electronic systems and simulation technology solutions for aerospace, defence and commercial markets A combination of product innovation driven by customer needs and business model innovation driven by changing market demands such as reverse logistics that drives reuse and recycle of products following customer use.
Steering Technology Supplier	A technology provider in automotive steering, from concept development and engineering design, through to marketing and intellectual property protection. Mostly design innovation – they licence their IP and provide equipment for its manufacture all over the world.

Table 5 provides a longitudinal view of a food sector manufacturer, Moira Macs, that had changed its business model over time. The evolving business models adopted have been linked back to the various characteristic business model types described in Table 2. In this case, the CEO's view of innovation was:

> *I think it is any transformation of a product or process that uses one or more unique inputs. I think you have to be fairly broad with it. It can be a new process or an incremental improvement that improves efficiency of product, process or people, but it seems to involve a unique output or strategy*

Some other cases in the food sector set followed a similar path – starting in food retailing or food service, and then moving into manufacture. Yet others have followed a 'paddock-to-plate' model moving from meat production to direct consumer marketing with additional value-added products.

Table 5. A Food Sector Case Study: Evolving Business Models

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Business Model	Background
1. Retailing (Type 7 in Table 2)	Moira Macs was established in 1983, initially operating a fresh poultry retail facility in a regional town market. Prior to that, the owners and worked in Europe for some time, where they were impressed by the variety of ready-to-cook poultry products (such as Chicken Kiev). They introduced such product to their regional town where they were regarded as novel. In establishing the business, they were able to draw on decades of family experience running butchers shops
2. Retail plus own product manufacture (Type 4 in Table 2)	They started making small goods and a cooked smoked chicken product as a sideline. These proved so popular, Moira Macs established a small manufacturing facility. This required knowledge of additional regulatory requirements and the installation of a packaging facility. The retailing business was sold in the early 1990's as there was increasing competition with low barriers to entry for such a business, and there were opportunities to grow the manufacturing business, with a specialization in cooked, ready-to-eat products for the wholesale trade.
3. Contract manufacturing (Type 1 in Table 2)	In the mid 1990's, the firm established a strategic partnership with a national small-goods firm, undertaking bulk contract manufacturing, and this continues today. There are also strategic partnership arrangements with two other large firms. Through this partnership, Moira Macs also established contacts in the large retail sector, where the firm started promoting its own brand products more actively over the past decade. . Moira Macs also makes a variant of its product for sale under a supermarkets own brand. In 1995, the firm gained ISO 9000 QMS accreditation (one of the first in its industry sector)
4. Own product design and Manufacturing for wholesale distribution (Type 3 in Table 2)	In 2011 Moira Macs installed a new kind of cold pasteurization process called hyperbaric pressure pasteurization. Some support was provided by the CSIRO Food Innovation group, who had good technical knowledge about the process. A CSIRO researcher was located at Moira Macs for a period of time. This has been a two-way arrangement where practical experience gained has been fed back to the research team. This process allows the firm to develop product that is free from chemical flavorings and preservative, and follow a niche market trend where this is valued. There are some staff dedicated to 'recipe' development, which involves both flavor formulation and cooking/packing process arrangements. Moira Macs has long-standing relationships with regional suppliers, and as the business has grown, has established a relationship with a national supplier. The firm is an active member of a regional poultry cluster group that works cooperatively on specific projects.

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5 Discussion

In the following discussion we comment on each of the elements shown in Figure 2. Many of our observations are consistent with those of others reported in the literature.

5.1 Innovation is personal

We have proposed that innovation in SMEs is largely a personal process (proposition 1), driven predominantly by one or two key people in the organisation. This may vary as the size and maturity of the SME increases; however we observed the social networks and entrepreneurial drive of these key owners/ managers is an essential aspect of innovation within an SME. Peltier and Naidu (2012) have shown that '... social networks for small businesses change as firms transition from startup to growth and beyond. Personal networks were most important during startup, with other social networks growing in contact frequency and importance over time.' Other researchers (Ceci and Iubatti, 2012) have shown the existence of personal relationships between partners in SME networks facilitates the success of the diffusion and adoption of innovation, increasing the firms' competitiveness.

5.2 Purposeful networking

By 'Purposeful Networking' we mean strategically choosing to access many different kinds of networks for different purposes at different times (proposition 2). Examples we observed were: (i) participation in government or industry association facilitated networks for business improvement; (ii) involvement in university or other research institution led research exchange networks; (iii) use of social media technologies such as LinkedIn or Facebook to source new partners, suppliers or ideas for business development and improvement; and (iv) use of sophisticated IT-driven platforms for collaborative product development between SMEs, consistent with the observations of Shamsuzzoha, et al (2016). Networking has long been recognized a valuable source of external ideas for firms seeking to innovate, whether they are manufacturing or service-based. Recent research has strengthened this support (e.g Ci-Rong Li et al, 2014). Alexander and Childe (2013) considered the contribution of tacit knowledge transfer processes between universities and business to innovation within the businesses. They concluded that tacit knowledge transfer through face-to-face interaction is most successful, and that it is dependent upon the context, content and process of the knowledge transfer. This rings true in our studies as well, where we found that those SMEs who were more proactive in considering innovations to their substantive business model demonstrated a much greater involvement in external networks. The plant manager of the carpet manufacturer who had developed an innovative product-service system to replace its traditional manufactured product stated:

Again we have contacts at universities of course. So [we network with] *academic institutions. I mean the management here, most of it has been around longer than I have, so they have obviously established networks through their history. We operate through the Carpet Institute which is based in Melbourne. We have four members of that, so there's obviously the networking that that provides, both within and without, because effectively, they lobby on behalf of the carpet industry, the industry as a whole.*

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5.3 Perceptions of dominant business models

We identified six different business models (see Table 2) that were directly associated with manufacturing sector SMEs plus a services model, and there may be variants of each model (proposition 3). The study by Barjack et al (2013) referred to earlier, illustrated that thinking about a change in the firm's business model first can reveal associated product/process/marketing/organizational innovation to implement such a change. In the cases examined in this paper, some firms changed their business models over time (e.g. see Table 5), but establishing parallel business models was also an increasing trend, consistent with the observations of Sabatir et al (2010). Examples are contract manufacturers acquiring their own product, and own product manufacturers taking on some contract manufacture. Variants of a business model related to volume and variety were also observed in our data set (e.g. tool-making firms c.f. routine production firms). Volume / variety combinations influence the nature of production (Chapman et al, 2008) and of service (Silvestro, 1999) business models as each combination represents a different value proposition, and may require some different infrastructure.

5.4 Linking factors

In Table 6 we use the Moira Macs case study (as described in Table 5) to illustrate the Figure 2 linking factors at work, and how they influenced business positioning. The linking factors are: 1. Sensing competitive positioning; 2. What makes business sense; 3. Prior experience with different business models; 4. Sensing the opportunity to innovate; 5. Attitude to innovation and knowledge of processes; 6. Sensing the need to innovate.

Table 6. Examples of linking factor influence

Figure 2 Linking Factor	**Impact on Business Positioning in the Moira Macs Case**
Sense competitive positioning	Identification of growing competitiveness resulted in withdrawal from the retailing business and a move into manufacturing
What makes business sense	Quitting retailing introduced a focus on process innovation
Prior experience with different business models	Family business experience supported company start-up, later experience in contract manufacturing supported own-product development and manufacturing
Sense opportunity to innovate	Initial contract manufacturing led to linkages with supermarkets supporting launch of own brand
Attitude to innovation, knowledge of processes	Use of design control and continuous improvement aspects of ISO 9000 to manage innovation projects

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Figure 2 Linking Factor	**Impact on Business Positioning in the Moira Macs Case**
Sense need to innovate	Identification of a growing demand for preservative-free food led to the introduction of a new cold pasteurization process

Gilmore, Carson and Grant (2001) noted linkages between networking activities and learning. We have speculated that the interaction between sets of these linking factors may be viewed as alternative innovation mode two-way learning loops in relation to the linkages in our model (Figure 2). The most common loop (left side) is: - sense a need, sense an opportunity, act using personal and enterprise knowledge (e.g. market-driven innovation). Or in a reverse flow: sense an opportunity, act using personal and enterprise knowledge, sense a need/application (e.g. technology-driven innovation). Another (right side) is: sense a need, sense competitive positioning, adapt the business model to make business sense; or identify a need, frame a suitable business model, enhance competitive positioning (e.g. business model innovation). A third (bottom side) is more strategic in nature: sense an opportunity, draw on prior experience with different business models, enhance competitive positioning (business model innovation) - or, sense competitive positioning, adapt a business model drawing on prior experience, identify new opportunities (e.g. organisational innovation).

5.5 Innovation framing, innovation need and scope

For firms of all size, the dominant purpose is making money and this means the expenditure of time and resources on innovation has to make business sense. The Business Council of Australia (BCA) is an association of Chief Executives of 100 of Australia's leading corporations. As with our SMEs, case studies of 19 member firms revealed different discourses relating to innovation, depending on the nature of the firm's business. The common view was that innovation can be defined as the:

> '*. . . .application of knowledge to create additional value and wealth. There are times when this involves the application of new knowledge, but novel outcomes could also be achieved by applying existing knowledge in new and different ways. Innovation occurs across a business, customer value is central, and human capital is crucial.*'

We see this as consistent with the views expressed in our SME data set. The BCA suggested innovation management practice will change in the 21st century, moving from a product focus to a customer solution focus. The BCA noted that in industries such as processed food, groceries, and consumer electronics, the pressure to build and retain market share is having the effect of making product life cycles shorter. An example from our data set is a software/microchip design firm:

> *In the marketing area, we have we have taken an innovative approach to the development of our IP using an open source model. We throw our IP out to a wider community, and have*

> *thousands of people working on its application and development. We then take that back and enhance our asset base in the application of technology, not the ownership of technology.*

We suggest that what identifies a firm as innovative may need to be reconsidered. The Oslo Manual defines innovation using a structural view that does not include the word value. Perhaps it is assumed businesses would not undertake innovation that does not make business sense. Early editions focused on technological product and process innovation in manufacturing. In the 2005 edition, the scope of what was considered as innovation was expanded to include marketing and organisational innovation. Mergers and acquisitions are not considered to be organisational innovations. A new section also included reference to innovation linkages. Innovation diffusion is considered from the perspective of what is new to the firm, but not what happens within the firm. The final definition of innovation adopted was 'An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.'

Our argument here is that innovation needs to enhance the value proposition offered by the firm and beneficially change the financial arrangements – adapting or reinventing the firm's business model. The Oslo manual also states that '... an innovation-active firm is one that has had innovation activities during the period under review, including those with ongoing and abandoned activities.' We see this temporal limitation as potentially masking real innovation dynamics, as SMEs may introduce something new, then spend some time refining it. For example, when we asked the CEO of Moira Macs what has been done that was new in the last two years, the reply was:

> *Our main thrust is in additive reduction in authentic food, and authentic roasting. If you had said four years, I would have included our high-pressure pasteurisation facility that helps us to dramatically reduce additives whilst increasing shelf life. In the last few years we have been refining that process. We have changed our approach to flavour, and this year released 26 new products, with a proportion utilising the preservative free option and new roasting techniques. We are using more authentic ingredients rather than typical food industry flavourings like pre-mixes and blends that are designed for manufacturing convenience - getting back to a more craft approach."*

The point to make here is that for SMEs there are a number of temporal factors that influence what is happening at a particular time, consistent with the observations of others (e.g. Allison et al, 2014; Moss et al 2014).

6 Concluding Remarks

Chesbrough (2010) had observed that selecting an appropriate business model to support an innovation was critical to its successful deployment. We introduced the thought that viewing SMEs in terms of their dominant business model(s) may allow insights into their innovation orientation and we reviewed case study material collected from some 50 SMEs over the past decade or so. We explored the embedded narratives and the development of these firms over time. We offer a

complementary viewpoint to that of Chesbrough – that the nature of innovation undertaken by an established firm depends on its dominant business model, and this also influences the nature of networking undertaken. For example contract manufacturing firms regularly network with process technology providers.

We noted a variety of perspectives amongst SMEs on what innovation involved, and clustered these in terms of seven different kinds of business models associated with manufacturing and related service sector firms. We observed that firms may operate more than one business model in parallel (e.g. contract manufacturing and own-product design and manufacture), and that the business models they adopt and adapt may vary over time.

As noted elsewhere in the literature, our SME's generally viewed innovation as anything that makes money, or as the BCA (representing larger firms) defined innovation - *the application of knowledge to create additional value and wealth.* Inspired by the literature on business models, we suggest this simple definition helps frame opportunities for innovation – is it in what is delivered to customers, where it is delivered or how it is delivered? We have also identified from the case studies that innovation is personal in both small and large firms, needing an innovation champion and cooperation between multiple professions, but adding that incorporating some structure to the management of innovation can be beneficial.

We make three contributions to the literature. Our first contribution, illustrated in figure 2, lies in the recognition that the scale and scope of conditions for continuous innovation within SMEs is dependent upon the both the kind(s) of business models they adopt, and the individual entrepreneurial mindsets of the key owners and managers within the SME. Secondly, the level and type (personal, business, inter-organizational) of purposeful networking undertaken by these owners and/or key managers of the SMEs will influence and be influenced by both of these factors and their innovation orientation. Thirdly, we suggest that the type of business model influences the scope for innovation and viewing firms from this perspective can support better cross-sector comparisons, e.g. comparing similarities and differences in contract production in farming or food processing or electronics or mechanical components.

We have observed some temporal factors associated with the dynamics of SME innovation that may help understand why surveys may give inconsistent results. Firstly, SMEs may not relate their activities to definitions of innovation associated with a particular survey, and secondly, they may not see their current activities as innovative if they are bedding down a change introduced at an earlier time. We have observed that SMEs may change or supplement their business models over time to maintain a competitive position, and that implies they may have to learn about new types of innovation.

Building on the observations of Gilmore, Carson and Grant (2001) that there are linkages between networking activities and learning, we have speculated that the model shown in figure 2 may also be viewed as suggesting multiple generic learning cycles all moderated by networking of some kind, and this could be a topic for future research.

We recognize that our study has limitations commonly associated with qualitative studies and that we only considered a small, non-random sample of manufacturing SMEs. However we suggest the viewpoints presented provide a foundation for further research into the dynamics of SME innovation.

ISSN 2183-0606
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ISSN 2183-0606
http://www.open-jim.org

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