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**ORGANIZATIONAL INNOVATIVENESS MEASUREMENT:
INCORPORATING CSI AND CFI IN THE DEVELOPMENT OF A
DIAGNOSTIC TOOL**

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Master's Thesis in
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ABSTRACT :

Organizational innovativeness is the latent capability of an organization that produces innovation over time. This is like any other abilities of an organization such as producing goods, services and thus it can be influenced, improved and increased with proper focus and deliberation.

The role of innovativeness in the survival of business is essential and unavoidable and yet the findings and constructs in the field of organizational innovativeness are fuzzy and inconsistent. To address this need, this research begins with two research questions: what is the current state of innovativeness measurement in technology companies? And How can a diagnostic tool help to ensure growth and success for technology companies? In conjunction with three objectives: identify and present a set of critical success indicators (CSIs) and critical failure indicators (CFIs) for technology companies to be innovative, determine how innovative technology companies position themselves to ensure growth and success in the marketplace, and develop a tool that can be adopted by technology companies to measure their innovativeness successfully.

The quest to close this research gap and provide a comprehensive diagnostic tool, the research proposes a framework that combines critical success indicator (CSI) and critical failure indicator (CFI) into the same framework to diagnose organizational innovativeness. This framework consists of five dimensions: culture, leadership, strategy, structure, and execution. And synthesizes a set of CSIs and CFIs for each dimension. This research applies mixed method research. The empirical data were collected from focus group study, semi structured interview and survey.

The results from the empirical study suggests that pursuing critical success indicators do not necessarily result in higher levels of organizational innovativeness. Rather, it is the pursuit of both critical success indicators and critical failure indicators that help organizations in enhancing their overall organizational innovativeness level. This study proposed a diagnostic tool that a business can implement to assess its organizational innovativeness continuously and devise improvement plans based on the current outcome. A simple and intuitive visualization matrix created in this research helps a business management team to draw conclusions and gain insights into innovation dynamics of an organization.

KEYWORDS: Organizational Innovativeness, Critical Success Indicator, Critical Failure Indicator, Diagnostic Tool

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Abbreviations

OI – Organizational Innovativeness

CSI – Critical Success Indicator

CFI – Critical Failure Indicator

1 Introduction

This chapter begins by outlining author's motives and purpose to engage in this research. It identifies the research gap, outlines research questions and objectives for the research. To begin the further research process, it creates a research design where research methodology and data collection strategies are identified. The rest of the section discusses structure of this research followed by definition and limitations of key words.

1.1 Background and purpose of the research

Peter Drucker (1955) stated that the only valid reason for the existence of a business is to create a customer. Since creating customer is a business' major purpose, entrepreneurial function such as innovation and marketing are considered to be the basic functions of any business. Schumpeter (1976) further added that business survives through 'creative destruction' - a basic quality of being innovative where one concept or idea or innovation is made obsolete to give life to another innovation. Therefore, in order to sustain a business and/or to keep or create customers, businesses need to innovate continuously as Schumpeter (1946, 84) outlined innovation or new is the only kind of competition that counts in the marketplace. And hence, innovation is not only considered as a key to survival but also an ultimate goal for a business (Drucker, 1955; Beimborn et al., 2010). A survey by Marwaha et al. in 2005 revealed that 4 out of 5 IT executives consider innovation as an essential success factor for their firms and see a strong correlation between innovation and performance. No surprise, innovation has become one of the main goals of any corporates and considered as not only essential but unavoidable for creating and sustaining

competitiveness in the marketplace (Schumpeter, 1946; Drucker, 1955; Schumpeter, 1976; Marwaha et al., 2005; Beimborn et al., 2010).

Innovation and innovativeness are interrelated concepts where one affects the other directly or indirectly (Subramanian, 1996; Dibrell et al., 2008; Kamaruddeen et al., 2010). The argument that which one is antecedent of which is still debatable (Kamaruddeen et al., 2010; Ruvio et. al., 2013) but for the sake of clarity, this research proposes that innovation is the result of being innovative. Therefore, the way innovation is studied affects how innovativeness has been interpreted (Dibrell et al., 2008). Innovation is a complex phenomenon that has been studied from different perspectives including output and process perspectives (Dibrell et al., 2008). And since innovativeness is measured in terms of innovation adopted and/or produced, innovativeness has been measured and presented differently resulting in inconsistent findings and conceptualizations (Dibrell et al., 2008; Beimborn et al., 2010; Ruvio et. al., 2013).

A research conducted by Beimborn et al., 2010 suggests that there are three major different measurement patterns of innovativeness in literature: Innovation adoption vs. innovation creation, Innovation type: product/service vs. process, and Input-oriented vs. output-oriented measurement. They further add that these measurement tools and systems are neither consistent in itself nor consistently applied in a certain way. Other scholars also support this finding by positing that there is inconsistency among innovativeness measurement construct (Wolfe 1994; Damanpour, 1991; Garcia & Calantone, 2002; Wang & Ahmed, 2004; Cho & Pucik 2005; Dibrell et al., 2008; Gamal, 2011; Ruvio et. al., 2013). The purpose of the thesis is to contribute to the measurement dimension of innovativeness by creating a tool that will allow corporates to measure their innovativeness comprehensively and effectively. A new innovativeness diagnostic tool will provide researchers with a systematic method for evaluating the connection between innovativeness and a company's performance. In addition to that, companies will be able to evaluate their

innovativeness level, gain insights into what they are doing right and how they can continuously improve their innovativeness.

1.2 Research gap, questions and objectives

Organizational innovativeness is studied from many perspectives and constructs are numerous. The table below outlines the research and their contribution to organizational innovativeness measurement development.

Table 1. Research on organizational innovativeness

Research	Focus
Rogers, 1995	The pioneer in consumer innovativeness measurement outlines that organisation innovativeness is behavioural progressiveness over time. In other words, it is what an organization does over time.
Subramanian, 1996	He posits innovativeness as adoption of innovation over time and outlines what an organization has done or is doing in order to be more innovative.
Ahmed & Wang, 2004	This research has identified five overall dimensions of organizational innovativeness where authors have listed a set of activities that an organization does that makes it innovative.
Hult et al., 2005	They outline innovativeness as a part of organizational culture where capacity to innovate is its outcome. They further explain what constituents such a culture and what they do there to innovate.
Dibrell et al., 2008	This research describes what an organization has done and is doing to elevate performance of an organization and thus increasing innovativeness level of an organization especially in the softwood sawmilling industry.

Clayton et al, 2011	They have identified the key dimensions that an organization should focus on to be more innovative and outlined major activities and practices that an organization can adopt to facilitate innovativeness.
Gamal, 2011	This research has outlined different methods/frameworks to understand innovation metrics and how they were developed with the aim to bring understanding of how innovativeness can be measured in a company. This research basically outlines what a company should do to be more innovative.
Bodell, 2012	She has demonstrated how good organizations kill innovations and maintains status quo and further provides insight into what they should do to foster innovation and being innovative.
Ruvio et. al., 2013	This research conceptualizes organizational innovativeness as a climate of an organization that facilitates the generation of new ideas and innovation over time. Authors have highlighted what an organization should do in order to achieve high level of innovativeness.
Davila & Epstein, 2014	Writers of this book has highlighted how existing organizations obstruct breakthrough innovations and come up with an interesting way to facilitate such innovation inside organization.

As depicted in the table above, the existing literature on innovativeness and measurement tools solely focus on what an organization has done, is doing and should be doing right in order to be more innovative (Rogers, 1995; Subramanian, 1996; Ahmed & Wang, 2004; Hult et al., 2005; Dibrell et al., 2008; Clayton et al, 2011; Gamal, 2011; Ruvio et. al., 2013). In other words, the entire focus of these measurement tools is on metric and/or activity that has added some positive value(s) to the organization, synthesized as critical success indicators in this thesis. Too much focus on anything including but not limited to success indicator not only deteriorates innovativeness but also stagnates it (Clayton et al, 2011; Bodell, 2012; Davila & Epstein, 2014). Therefore, focus, deliberation and shifting perception are keys to enhance organizational innovativeness (OI). Hence, this thesis not only

incorporates what causes an organization to be more innovative, conceptualized as critical success indicators (CSIs) to develop a diagnostic tool but also bring what they do not do that causes an organization to be more innovative, conceptualized as critical failure indicators (CFIs) into the scale development and thus provide a comprehensive look at an organization's innovativeness. The thesis aims to answer the following questions considering the research gap and purpose outlined above:

1. What is the current state of innovativeness measurement in technology companies?
2. How can a diagnostic tool help to ensure growth and success for technology companies?

The research will explore existing literature on innovativeness and technology companies and aim to;

1. Identify and present a set of critical success indicators (CSIs) and critical failure indicators (CFIs) for technology companies to be innovative.
2. Determine how innovative technology companies position themselves to ensure growth and success in the marketplace.
3. Develop a tool that can be adopted by technology companies to measure their innovativeness successfully.

1.3 Research design

This research utilizes a mixed-method approach that combines both qualitative and quantitative research methods to answer the questions that have been established and to deliver the objectives that have been set for the research. In-depth interview and survey have been chosen as strategies to further investigate the research. The need for in-depth analysis is apparent as the research requires to delve into the organization's environment, culture, mindset, activity, process, influencing factors to develop a diagnostic tool that can measure innovativeness of the organization

effectively and comprehensively. similarly, a survey must be conducted to test the feasibility of the tool itself and validate its reliability.

The qualitative research will be used for deductive reasoning to synthesize the literature in the field of organisational innovativeness, especially in the technology industry. Thus, knowledge synthesis will be used as the building block of the proposed diagnostic tool in this work. Similarly, the quantitative research will be introduced due to the objectives that have been outlined for the research, that is to validate and re-examine the concepts extracted from the literature and to demonstrate the feasibility and practicality of the diagnostic tool. The research design has been divided into the following parts: sampling, data collection, measurement and analysis.

Due to the unsettled argument on a universal definition of organizational innovativeness (Wolfe 1994; Damanpour, 1991; Garcia & Calantone, 2002; Wang & Ahmed, 2004; Cho & Pucik 2005; Dibrell et al., 2008; Gamal, 2011; Ruvio et. al., 2013) and for the sake of clarity and effectiveness, this research chooses to collect the sample from the following parts of an organization: cultural dimension, process dimension, Leadership and management, and influencing factors (Garcia & Calantone, 2002; Wang & Ahmed, 2004; Hurley et al., 2005; Dibrell et al., 2008; Beimborn et al., 2010; Gamal, 2011; Ruvio et. al., 2013).

The data collection process will start after establishing a theoretical framework through literature review and preparing the building blocks for the diagnostic tool. The data collection method includes focus group study, semi-structured interview and survey. The aim with focus group study and semi-structured interview is to collect data that will allow the author to validate the theoretical framework and set of CSIs and CFIs. The goal with survey is to collect data to measure innovativeness of an organization. And finally discuss with companies to test and verify the feasibility and reliability of the diagnostic tool.

1.4 Definitions and limitations

Innovativeness is defined as a firm's propensity and capability to rapidly incorporate change in business practices through the creation and/or adoption of new ideas that add value in the form of increased competitiveness and sustainability (IGI Global, 2019; Dibrell et al., 2008).

As a limitation, this definition of innovativeness purposefully put the focus on organizations and does not include consumer innovativeness. Similarly, the innovativeness will primarily be dealt with within the context of the technology industry and thus disregards all other Industries.

Critical success indicator (CSI) is defined as a set of limited or very specific indicators that indicates that an organization is achieving success and gaining competitive performance (Cheyanne & Mark, 2006; Martin, 2015; Choubey, 2017).

As a limitation, CSI does not outline the process of how an organization decide on such indicators but rather presents common indicators that are applicable to the technology industry.

Critical failure indicator (CFI) can be defined as a set of indicators that must not be performed to achieve desired outcomes. In other words, CFIs are about predicting, discovering, and preventing points of failure, even if the CFI points are hidden.

CFI, however, does not instruct an organization on how it should structure its activities. It simply points out a set of indicators that might hinder organizational innovativeness and thus should be avoided.

A diagnostic tool is an instrument consists of a procedure designed to determine an organization's innovativeness (Santanusagna, 2012; Spine-health 2019). The tool, however, does not inform an organization why it has such a level of innovativeness and how it could be improved. Such deduction and improvement plans are outlined

and discovered after the diagnosis. It basically measures the current innovativeness and communicates the result.

Similarly, organizational innovativeness is also influenced by external factors such as politics, society, economy, laws and regulations. These external factors are outside the scope of the study and hence considered as limitations of this research.

1.5 Structure of the thesis

This section outlines how this thesis is structured and what each section includes as shown in figure 1 below.

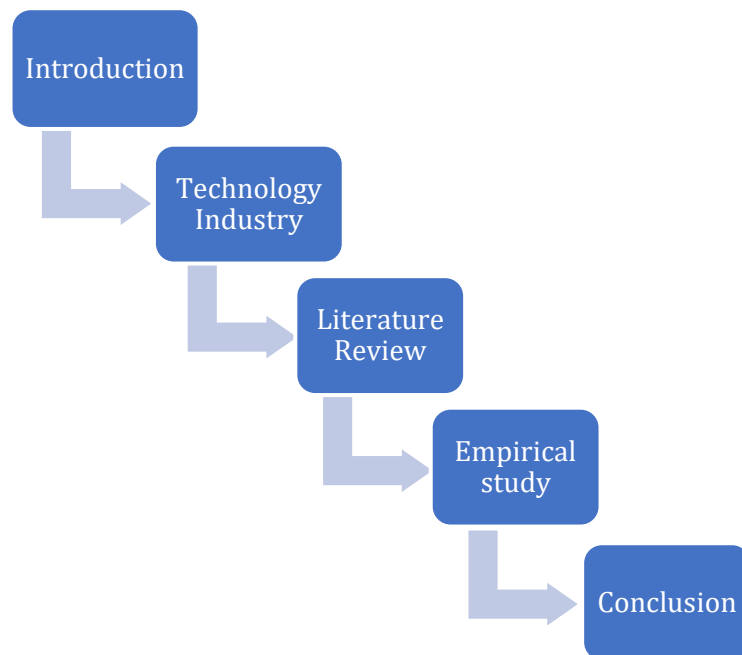


Figure 1. Thesis structure

Introduction section draws attention to the importance of innovation and its contribution to the survival of a business. In addition to that, it also outlines the role innovation plays in keeping a business innovative and how innovativeness is measured. Similarly, this section further points out the drawbacks of the current innovativeness measurement tool and establishes a research gap, outlines research

questions and objectives for this research. Furthermore, it briefly highlights the research design and definition and limitations of the keywords chosen for this research.

The second chapter of this study concerns with the technology industry which is the scope of this research. It starts by depicting how the technology industry is growing in different parts of the world. It further points out the growth projection for the technology industry and the factors that are helping and hindering the growth of this industry. It also points out how the industry is classified and how revenue stacks up against existing and emerging categories. Moreover, it delves into the evolution of the technology industry where lifespan, growth game, competition, and emerging technologies are discussed in detail and linked to the organizational innovativeness. It suggests how innovation will further facilitate growth and competition and diminish lifespan of business. And therefore, urges to focus on increasing organizational innovativeness to survive in the marketplace.

Literature section begins by outlining the different perspectives on organizational innovativeness and defines organizational innovativeness considering research questions and objectives. This chapter further discusses the concept of CSI and CFI, and brings existing literature on organizational innovativeness, especially in the technology industry together and synthesize them to create a theoretical framework, that is, the building blocks for a diagnostic tool that this research intends to develop.

The empirical section focuses on research methodology, strategies for collecting data through focus group study, semi-structured interviews, and survey. It documents the result of each research method and draws conclusion to help build a diagnostic tool. It also outlines the result of diagnostic tool in two companies and presents them with improvement plan to enhance their innovativeness. This also presents discussions with the companies to improve and validate the tools credibility. This chapter further discusses the reliability and validity of this research with a goal to increase diagnostic tool's validity and scalability.

The final section of this thesis summarizes the entire research and presents answers to the outlined research questions. It also discusses how the objectives set for this research are achieved and its contribution to the field of organizational innovativeness. It further presents the practical implications of this research in a company and suggests future research directions.

2 Background of the technology industry

This chapter presents an overview of the technology industry. It outlines the dynamic within the industry and how its landscape is changing. It also discusses the factors that play a vital role in the industry's growth. Moreover, it brings attention to the evolution of the technology industry, how lifespan of technologies businesses is shrinking and the role of innovation in such rapid evolution.

2.1 Overview of the industry

Technology industry is one of the fast-growing industries in recent years (Admin's choice, 2019, Spiceworks, 2019). According to CompTIA article, the industry might reach approximately €5 trillion in valuation in 2019 globally. As digitization is touching more faces of life from economies, jobs, and personal lives to government sectors making them digital, connected, and automated. The technology growth engine seems to be on the verge to take a leap forward due to waves of unprecedented innovation over time.

In the global scale, USA holds the first place in tech market accounting for 31% of total market as shown in the diagram below followed by Asia and Europe respectively. Even though the market share of the USA is more than others, the customers live outside of the country. This further suggests that the impact of technology has been felt everywhere (CompTIA, 2019).

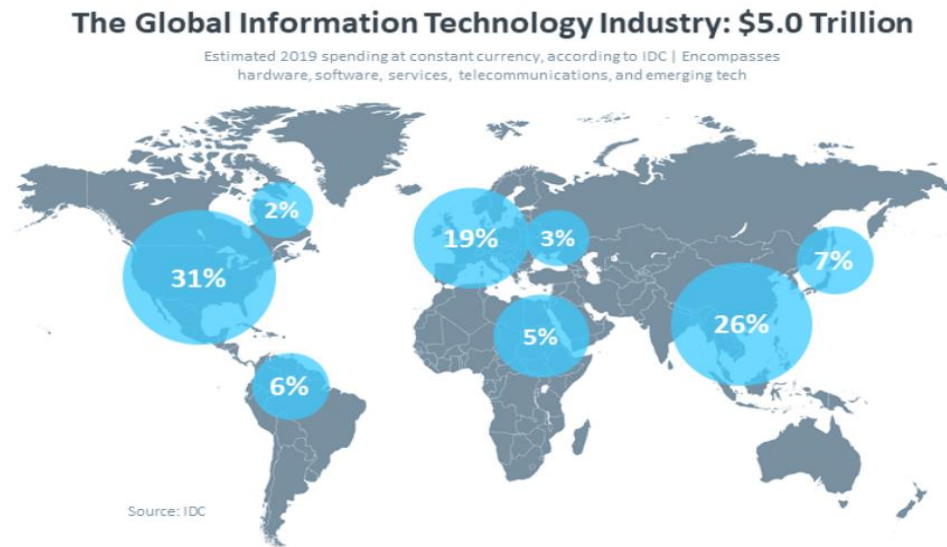


Figure 2. Share of the industry (source: CompTIA, 2019)

The growth for the industry is expected to be 4% in 2019 with the optimistic upside forecast is between 6% to 7%, with a downside forecast of 1.5% as shown in the diagram below (Bartels, 2017; CompTIA, 2019).

CompTIA Global IT Industry Growth Projection

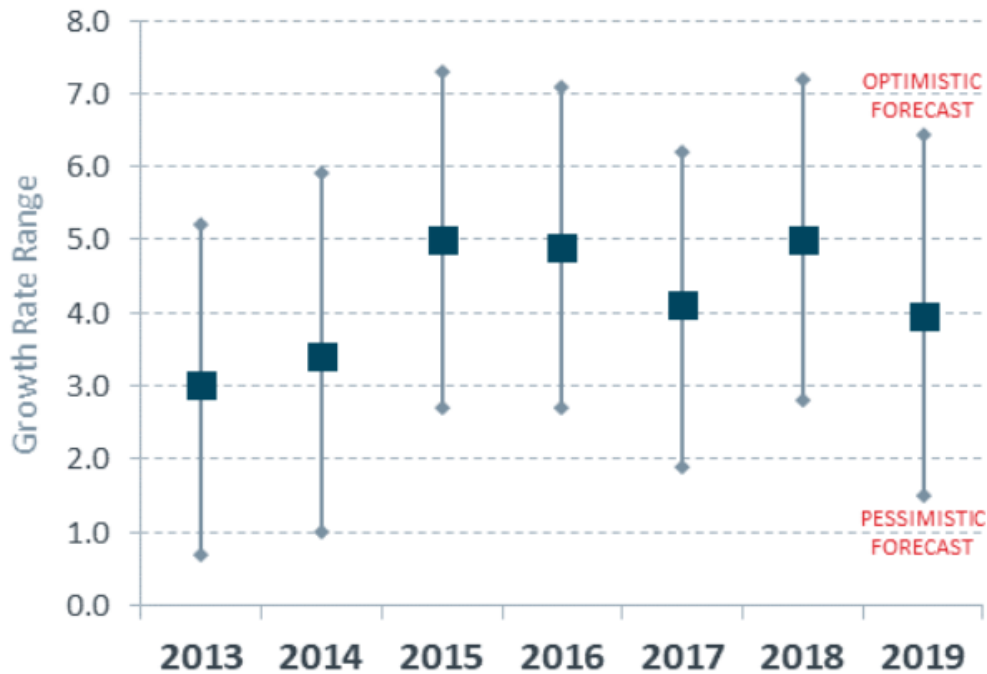


Figure 3. Technology industry growth projection (source: CompTIA, 2019)

The above graph explains a wider technology industry growth range compared to previous years industry growth rate due to the industry executives assuming that there might be extreme differences in growth scenarios. To the upside growth projection of the technology industry, if customer-buying patterns for core tech products and services maintain, and spending on emerging tech accelerates, growth of 6% or more is attainable. Conversely, a global slowdown in demand, or any slowdown in the adoption of emerging technologies could dampen growth enough to push it towards the 1.5% pessimistic side. Some other influencing factors are currency exchange rates pricing, and product mix. The diagram below depicts the dragging and driving forces behind growth clearly (CompTIA, 2019; Deloitte, 2019).

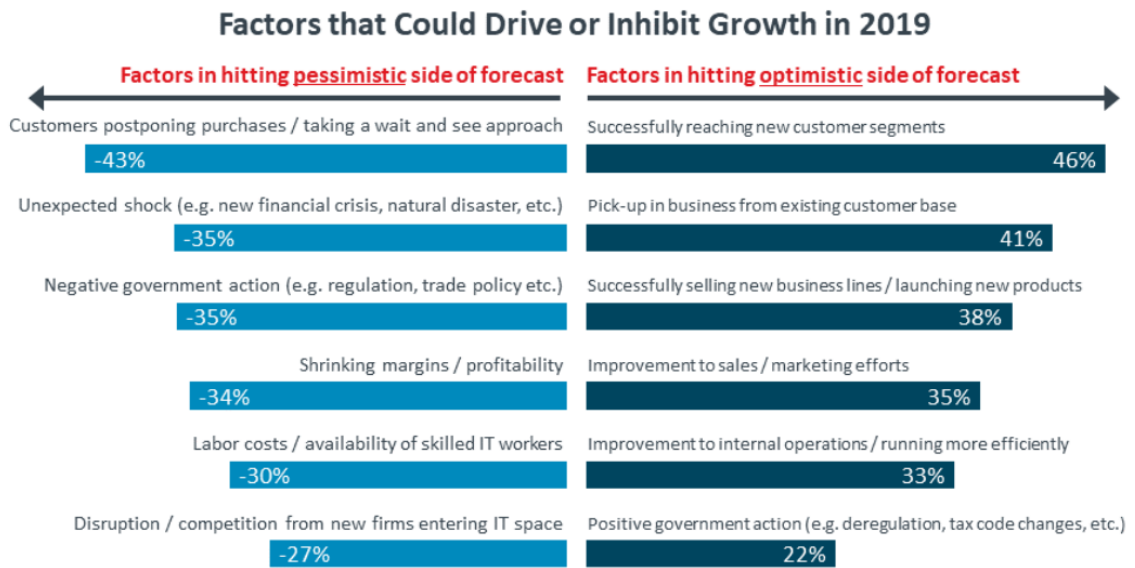


Figure 4. Factors that could enhance or inhibit the industry growth (source: CompTIA, 2019)

The conventional taxonomy of depicting the information technology space divides the industry market into five categories as shown in the figure below. What is fascinating about this diagram is that in less than 5 years emerging tech has already occupied 17% of total market stealing places from other categories and on the verge to make some categories obsolete. This points out how fragile and fast growing this industry is. Moreover, not being able to harness this dynamic paradigm will result in losing market share and thus business as a whole in a remarkably short period of time.

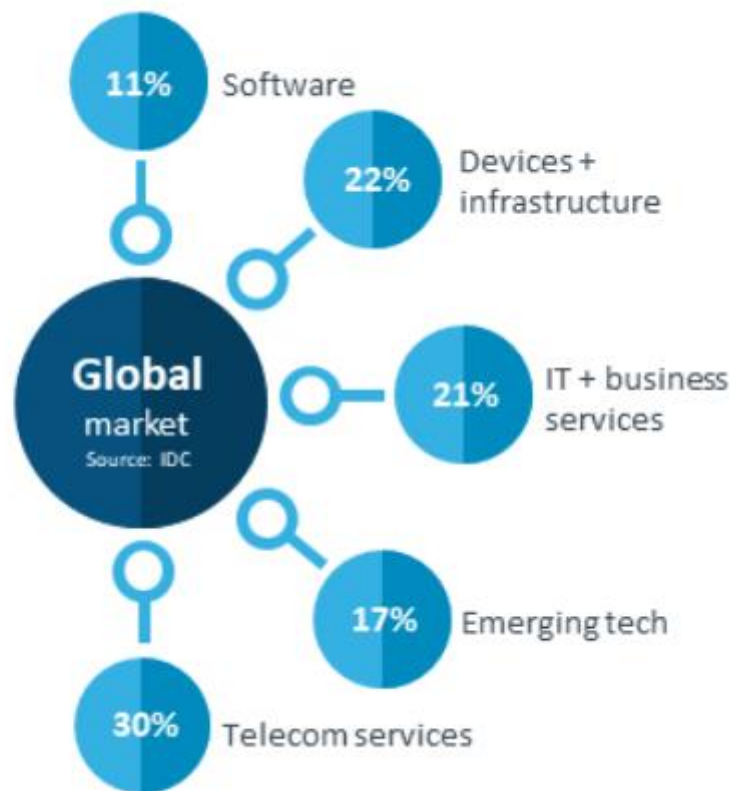


Figure 5. Categorizing the technology industry (source: CompTIA, 2019)

The allocation of the spending will depend on countries' current state of technological advancement such as availability of modern economy infrastructures (cloud and edge computing, 5G network) and influencing factors such as existing customers adopting new products and services, finding new customers and market segment and government acceptance of emerging technologies. However, what's appealing is that the revenue growth of emerging tech facilitated solely through technologies such as cloud computing, AI, 5G, IoT etc. are compelling and driving the industry in the direction of digital ecosystem. The digital economy not only provides agility to businesses to innovate and scale beyond the boundary but also positions them with an ability to prepare robust structure and have a profound control over the entire business process. Additionally, IoT, AI and technology of such provide businesses with an opportunity to understand the business environment.

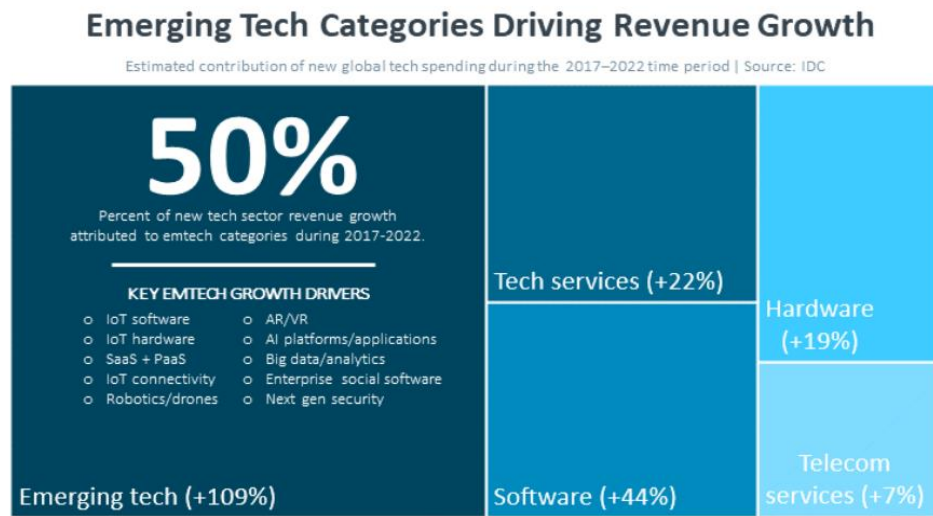


Figure 6. Revenue growth by category (source: CompTIA, 2019)

Emerging technologies that has a US market share of 13% only accounts for almost half of revenue growth. The research cites 109% growth rate for emerging tech from 2017 to 2022. A similar trend seems to hold true for other developed countries as well. The research further outlines even though the projected growth rate for emerging tech will be slightly low in underdeveloped countries, there is a chance that these regions will take a leapfrog in adoption of emerging technology. Data moves the pointer of a navigation in the direction of rapid disruption infused with high uncertainty and prompt growth.

2.2 Evolution in the technology industry

There was a time when ‘the next big thing’ used to be a theme in the technology industry. However, the constant evolution of technology and rapid technological innovation has made that theme obsolete. This industry is fast-growing and in high demand because it is difficult, uncertain and requires a high level of perseverance

and agility. Therefore, companies that know the ins and outs of the industry and specialization of tasks or areas are of high value.

2.2.1 The lifespan of technology companies

An organisation goes through development, launch, growth, maturity and decline phases in their lifecycle. Growth and maturity are the phases where revenues for an organisation thrive rapidly making it into the fortune 500 or S&P 500 companies. Anything that reaches the top eventually drifts down. Similarly, when the decline phase for an organization begins, it knocks off an organization from the fortune 500 (S&P 500) as the revenue starts to decrease and customers move on. This process used to be rather consistent and long for any organization - getting into fortune 500 and staying there for as long as 33 years in 1964. However, the disruptive force of technology is killing off older firms at a way quicker rate than decades ago. The studies show that the 33 years average tenure of corporations on the S&P 500 in 1964 narrowed to only 24 years in 2016. Organizations longevity forecast of Standard & Poor's (S&P) 500 corporations anticipate average tenure on the list growing shorter and shorter over a consecutive decade to as less as 12 years by 2027 as depicted in the figure below. At this churn rate, almost half of the S&P 500 companies might not be on the list after 10 years (Churchill & Lewis, 1983; Adler, 2014; Callahan et al., 2017; Anthony et al., 2018; YEC, 2018; CFI, 2019).

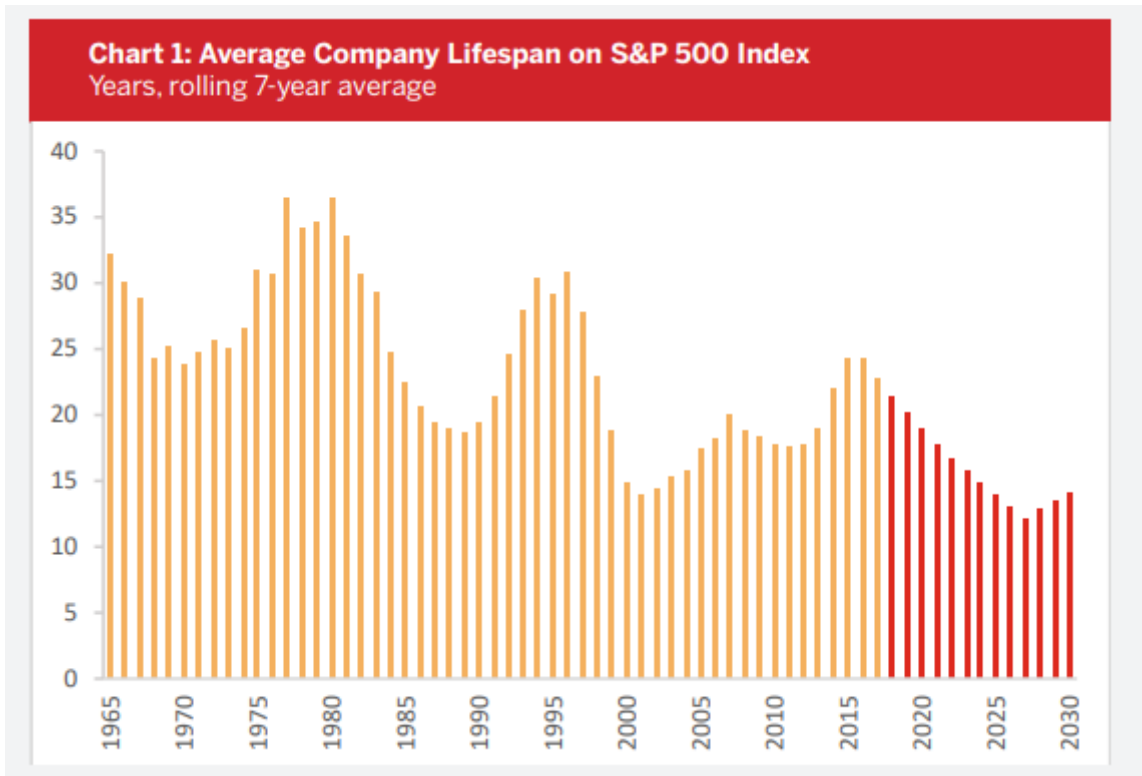


Figure 7. The lifespan of fortune 500 organizations (source: Anthony et al., 2018)

2.2.2 Growth: competition and market turbulence

By looking at the table below, one might would like to ask what do they have in common and why are places in three different groups? And the answer is they are taken from Fortune 500.

Table 2. Division of Fortune 500 into groups for comparison (Adopted from Perri, 2016).

Group A	Group B	Group C
American Motors	Boeing	Facebook
Brown Shoe	Campbell Soup	eBay
Studebaker	Deere	Home Depot
Collins Radio	General Motors	Microsoft

Detroit Steel	IBM	Google
Zenith Electronics	Kellogg	Netflix,
National Sugar Refining	Procter and Gamble	Office Depot
	Whirlpool	Target

Group A represents companies that were in the Fortune 500 in 1955, but not anymore in 2016. Group B represents companies that were in Fortune 500 in both 1955 and 2016. Group C represents companies that were not in Fortune 500 in 1955 but were in 2016. Research shows that only 60 companies from 1955 were in the list of Fortune 500 in 2016. In other words, the comparison of lists in 61 years show that only 12% (that is less than 1 in 8) were in Fortune 500 list and more than 88% of businesses were knocked off the list. This illustrates an increasing pace of market disruption, churning and Schumpeterian creative destruction over the last 60 years. This further suggests that the list of Fortune 500 in 2076 will have completely new set of organizations making even Group C companies which are innovative and disruptor at the moment, off from the list if they stop innovating. Furthermore, a research from Innosight outlined that the lifespan of fortune 500 companies will be only 12 years after 10 years as the pace of the creative destruction is accelerating. Every year, a variety of corporations drop off the S&P 500 list and are replaced by different firms (Mochari, 2016; Perry, 2016; Callahan et al., 2017; Anthony et al., 2018).

There are plenty of reasons behind this such as organizations have been acquired by others, entered into merger, simply fall below the market cap size threshold (currently that cutoff is about \$6 billion) or overtaken by faster-growing companies etc. Despite the reasons, this is a clear sign of warning to companies that if they stop delivering superior service through enriched value and innovation, there is no place for them in the S&P 500 (Fortune 500) list as they will be overtaken by disruptive startups. This further suggests that the fierce competition in the market leaves

organizations with no other choice than to be better. Moreover, what a better way to be better than being an innovative organization as Schumpeter stated almost a half century ago (Mochari, 2016; Callahan et al., 2017; Anthony et al., 2018).

Research shows that technological disruption has a significant impact on the stability of S&P 500 (Fortune 500) list and mirrors disruption from technologies, starting from biotech breakthroughs to social media to cloud computing in the list. Over time, the larger trendline is for average longevity to still slope downward. Market turbulence is going to pick up the pace as record nonpublic equity activity, a strong M&A market, and the growth of startups with billion-dollar valuations are leading indicators of future turbulence. Disruptive forces hit retailers hard and there are robust signs of restructuring in monetary services, healthcare, energy, travel, and assets (Mochari, 2016; Callahan et al., 2017; Sheetz, 2017; Anthony et al., 2018).

According to Credit Suisse, an analogous model will help make a case for why firms die. Winning firms usually have a core source of profits. For several reasons, company leaders tend to dedicate too several resources to the exploitation of profits and not enough for exploration. Commonly, exploration needs a distinct structure than exploitation, inflicting firms to stumble. The simplest firms are those who will skillfully balance exploitation and exploration. Furthermore, Anthony et al., 2018 posit that the turbulence points to the requirement for corporations to embrace a twin transformation, to focus on ever-changing client desires, and alternative strategic interventions. Therefore, measuring organizational innovativeness will equip organizations with the knowledge where they are good at and where they are not. This will position them with the knowledge that will facilitate strategic focus to capitalize on strengths and build necessary expertise where needed (Mochari, 2016; Callahan et al., 2017; Anthony et al., 2018).

2.2.3 Emerging trends

A glance into the previous decade reveals that organisations process and infrastructure relied on technology such as software and hardware, email, EDI, fax, and internal and external internet connection. Some organisations however using technologies now that was not possible to conceive back then. For example, the usage of hardware reached almost obsolete as organisations are adopting cloud-based technology. And similar trends are following in other areas as well. According to recent market research the following are the emerging trends that might drive technology industry in unconventional direction and even disrupt many sectors (CompTIA, 2019; Deloitte, 2019; Spiceworks, 2019).

Table 3. Categorizing emerging trends.

THEME	POTENTIAL
Modern economic infrastructure	The three pillars of fourth industrial revolution cloud, edge and 5G are driving the economy into a new direction by bringing undisputed flexibility, decentralization, fast connection and control over IT activities and processes (CompTIA, 2019; Cloudflare, 2019).
Ambient computing	The rise of computing power put into peoples' hands through mobile phones and cellular network and increasing growth of internet of things (IoT) and artificial intelligence (AI) will give birth to ambient computing where activities will take place seamlessly with almost no user interaction. For example, smart lighting (CompTIA, 2019; Deloitte, 2019; Spiceworks, 2019).
Evolution of distributed ledger technology (DLT)	The ability to provide transparency and visibility into every aspect of business or activity imaginable and unbreakable security position this technology as future potential disruptor of many industries including logistics, supply chain management, finance and transaction (Mire, 2018; CompTIA, 2019; Deloitte, 2019; Mearian, 2019; Spiceworks, 2019; Statt, 2019; Sweney, 2019)
Raise of stackable technologies	This is a concept borrowed from lego where different technologies or business solutions put together to solve a problem which is not a new approach but evolution in many areas from API based cloud technology to modular hardware design and business process widget, facilitate stacking technologies in more efficient and effective way thus leading to higher level of

	digitization and business transformation. (CompTIA, 2019; Deloitte, 2019;)
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The assumptions of executives and industry data analyst suggest that technology industry might experience disruptions due to emergence of disruptive technologies such as readily available modern economic infrastructure, blockchain and other distributed ledger technologies (DLT), hyper-personalization and increase in unexpected customer demand and evolving new startups. The trend in hiring new tech talent and training existing workforce is also the indication that the tech industry is experiencing a shift in thinking and way of doing business as shown in figure 8. CompTIA reports that hiring intent in large and medium-sized companies is concentrated reaching almost 4 in 10 U.S. tech firms report having job openings and are actively recruiting candidates for technical positions. Another 34% report having openings on the business unit side, such as project managers, market specialists, or sales engineers (CompTIA, 2019; Spiceworks, 2019; Deloitte, 2019).

Expansion + Need for Emerging Tech Expertise Driving Hiring

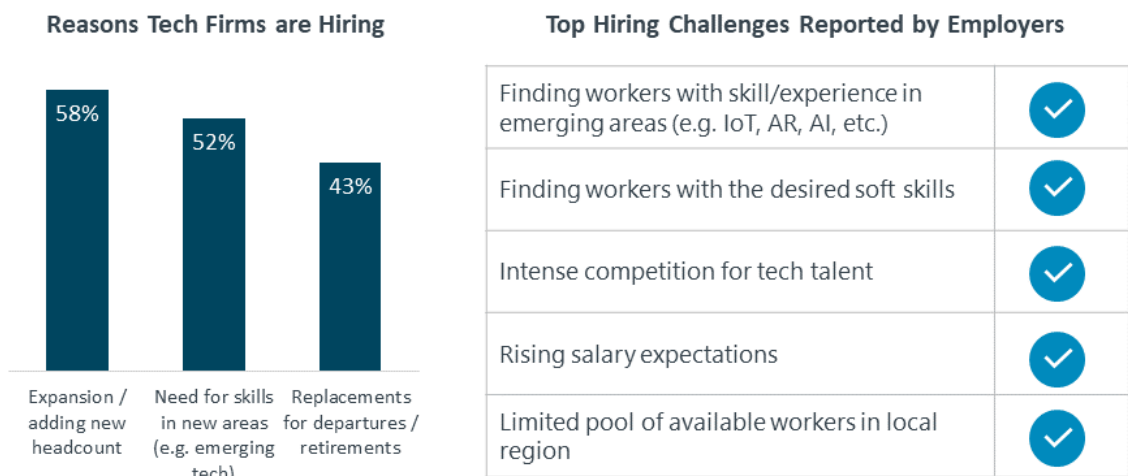


Figure 8. Major forces behind increase in hiring and challenges faced by employers (Source: CompTIA, 2019)

Among hiring employers, over than half indicate it is because of growth, whereas an identical proportion indicates the requirement for new skills in areas like machine learning, IoT integration, or robotics process automation (RPA). These two drivers for hiring are somehow interrelated. Companies increasing into new, rising areas need the requisite skills to proceed with their rollout. Although, some portion of the growth can also occur because of a growing client base in additional standard roles, like network engineers or IT support specialists. Furthermore, the role of IT had been some mix of tactical and strategic form to attain business objectives as shown in figure 9. In the traditional viewpoint, organizational goals were the domain of the business units including obtaining merchandise to market and driving client satisfaction was the scope of the sales team. Geographic growth unwearied on the shoulders of the operations team. In turn, the business units relied on the IT function to produce the support that allowed them to perform their jobs with bigger potency. Constructing a technical foundation, delivering the proper endpoint tools, and troubleshooting user problems were all necessary tasks inside a corporation, however primarily to the extent that they drove productivity. It had been usually viewed as a cost center, attempt to deliver a particular level of service inside rock bottom budget doable (CompTIA, 2019; Spiceworks, 2019).

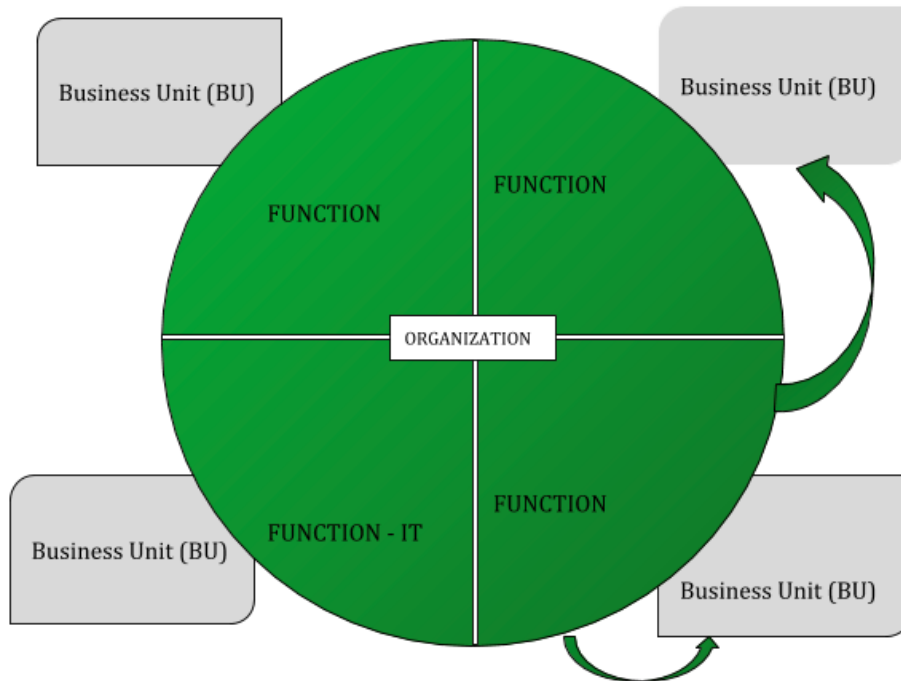


Figure 9. Traditional view on IT (Adopted from CompTIA, 2019)

Whereas the current state of IT is dual in nature: strategic and operational. It not only supports the business but also helps to achieve business objectives such as driving sales, increasing customer satisfaction, tackling customers complaints, reaching another market segment etc. as shown in the figure below. It is more strategic than functional (Anthony et al., 2018; CompTIA, 2019).

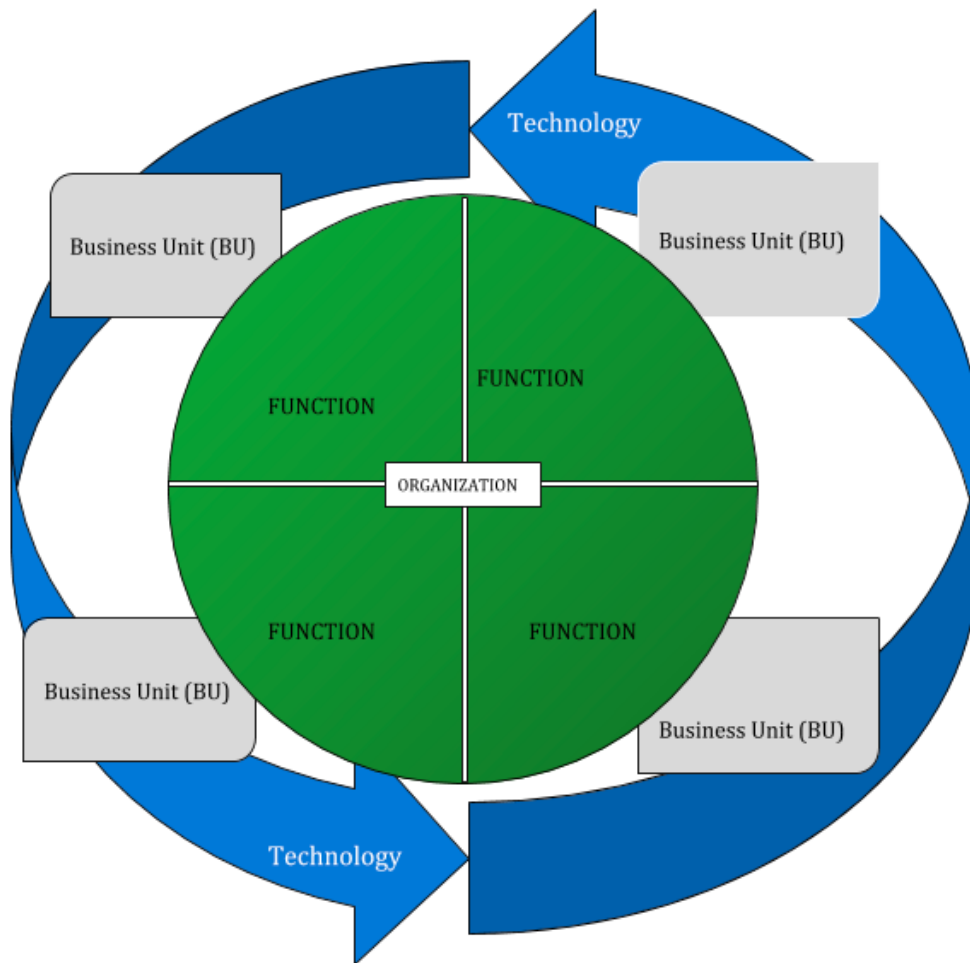


Figure 10. Fresh perspective on IT (Adopted from CompTIA, 2019)

Plethora of research demonstrates that the technology industry has experienced some level of disruption already and it might increase further. According to Lei & Slocum (2009), when an industry's environment is undergoing technological change, it is time for businesses to make a strategic move based on the level of changes felt by the industry. Such strategic move allows businesses to create new products and services, new business models, new knowledge and structures and thereby allowing business to survive (Lei & Slocum, 2009; Mochari, 2016; Perry, 2016; Callahan et al., 2017; Sheetz, 2017; Anthony et al., 2018; CompTIA, 2019; Deloitte, 2019; Spiceworks, 2019).

In conclusion, looking at the diminishing lifespan of tech organizations, fierce competition and market turbulence, emerging trends and unavailability of talented skills, growth potential and need to take a strategic leap points out that organizations in technology industry require more agility to match resources to opportunities, ability to connect the dots and speed of innovation diffusion (Price & Toye, 2017; Anthony et al., 2018). One of the most crucial qualities that provide such a level of agility to an organization can be achieved through enhancing the organizational innovativeness - the ability to produce innovative outcomes in the face of a highly uncertain situations. Therefore, measuring organizational innovativeness in the technology industry is vital due to its uncertain nature and rapid technological advancement in order to cope with rapidly changing environment and survive in the business world (Schumpeter, 1946; Clayton et al, 2011; Bodell, 2012; Ruvio et. al., 2013; Sheetz, 2017; CompTIA, 2019; Deloitte, 2019).

3 Literature review

This section outlines how organizational innovativeness (OI) research has evolved and how multidisciplinary study and focus led to incongruent findings. After pointing out different paradigms of OI, it establishes a definition of OI for this research and outlines the concept of CSI and CFI in relation to organizational innovativeness. Similarly, this section draws upon literature to establish the different dimensions of OI and outlines CSI and CFI for each dimension. In addition to that, it investigates different industries to explore and understand the concept and parameters of a diagnostic tool and introduces the concept of organizational innovativeness measurement diagnostic tool. Finally, it presents a theoretical framework for this thesis.

3.1 Organizational innovativeness

Collin dictionary (2019) defines *innovativeness* as “*the quality of being innovative*”, where *innovative* means “*introducing changes or new ideas or innovation.*” (CollinsDictionary.com, 2019; merriam-webster.com, 2019). The concept of innovativeness was introduced by Everett M. Rogers in 1962 in his book *Diffusion of Innovation* where he categorized individuals (e.g. farmer) into five groups (innovators, early adopters, early majority, late majority and laggards) on the basis of innovativeness level (Rogers, 1995) as shown in the diagram below. He defined innovativeness as “*the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system*” (Rogers, 1995).

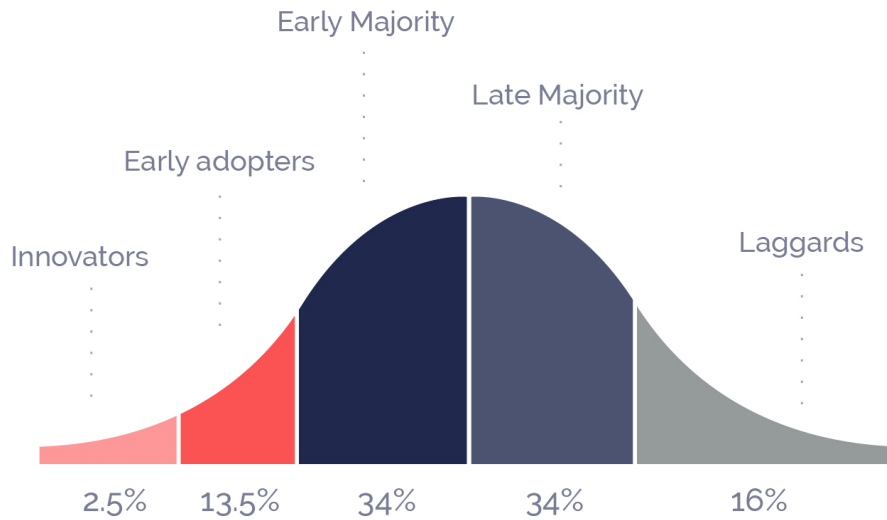


Figure 11. Roger's classification of innovative consumers (Adopted from Smith, 2017)

It is legitimate to beget the understanding that the concept of innovativeness was developed solely to measure how early or fast an individual/consumer adopts an innovation in relation to others. This definition, however, doesn't suggest that an individual create or invent or innovate something for some purpose that is beneficial to oneself and/or other members of the system or society. Additionally, Roger's categorization depended on the independent variable, an individual consumer (Rogers, 1995). After the overwhelming popularity and appreciation of Roger's research, some scholars (Utterback, 1974; Draft, 1982; Foxall, 1984) adopted Roger's concept and defined organizational innovativeness as the rate of adoption or simply the adoption of product and service inside an organization. Scholars posit that research that follows Roger's adoption paradigm does not measure innovativeness in its true sense (Avlonitis et al., 1994; Rogers, 1995; Ahmed & Wang, 2004; Ruvio et al., 2013) and stress the newness and development in the definition and measurement (Calantone & Garcia, 2002) of organizational innovativeness. Even, Roger (1995) suggested that organizational innovativeness that simply adopts consumer innovativeness research method does not measure OI truly as innovation is a process influenced by many internal (e.g. talent, resource, expertise, leader) and

external factors (new legislation, technological advancement, change in consumers expectations). He further conferred that research designed in such a way collects data from one or a few individuals (CEO, executives, managers, etcetera) in an organization that distorts the truth behind the actual innovation process because innovation is achieved with the help of a group of people and everyone inside an organization influence it directly or indirectly.

Consequently, researchers later started to deviate from the adoption paradigm and brought focus onto creation paradigm (Avlonitis et al., 1994; Subramanian, 1996; Danneels & Kleinschmidt, 2001; Sethi et al., 2001; Wang & Ahmed 2004; Hult et al., 2005; Ruvio et al., 2013). According to this paradigm, organizational innovativeness is about producing innovative outcomes (Avlonitis et al., 1994; Lumpkin & Dess, 1996; Subramanian, 1996; Danneels & Kleinschmidt, 2001; Sethi et al., 2001; Wang & Ahmed 2004). Lumpkin & Dess (1996, p. 142) defined innovativeness as *“the firm’s tendency to engage in and support new ideas, novelty experimentation and creative processes that may result in new products, services or technological processes.”* Similarly, Garcia & Calantone (2002, p. 113) defined OI as *“the capacity of a new innovation to influence the firm’s existing marketing resources, technological resources, skills, knowledge, capabilities, or strategy.”* This is where organizational innovation and innovativeness overlapped with each other into definition and conceptualization (Ahmed et al., 2010; Ruvio et al., 2013). For instance, Ahmed et al., (2010, 6) define organizational innovation following many other research (Damanpour 1987; OECD, 2018; Coriat, 2001; Chin & Wong, 2007) as *“a systematic positive change, through adoption or creation, made by a firm in terms of its structural characteristics, organizational creativity, managerial work practice and techniques, routine process and channels for the sole aim of increasing the firm’s competitiveness, market share and business performance”*. This shows how organizational innovation and innovativeness overlap each other and without distinguishing them the finding will be inconsistent. Therefore, this research applies the maxim “innovation is the result of being innovative” and for the sake of clarity defines innovation as *“a new or improved product or process (or combination thereof) that differs significantly from*

the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" (OECD, 2018). Henceforth, organizational innovativeness research that resembles this definition of organizational innovation or innovation is excluded from this research.

At the same time, there is some research that provides a clear and distinguished definition of organizational innovativeness. Subramanian (1996) defined OI as tendency to innovate continuously over time. Similarly, Hult et al. (2005) define organizational innovativeness as part of organizational culture that produces innovative capacity. Ruvio et al., (2013) refine the definition of Hult et al. (2005) and posits that organizational innovativeness is climate of an organization that helps in producing innovative outcomes over time. These definitions certainly shed some lights on OI but cover only part of it as organizational innovativeness is result of all other components and dimensions of an organization (Avlonitiset et at., 1994; Danneels & Kleinschmidt, 2001; and Sethi et al., 2001; Ahmed & Wang, 2004).

Avlonitis et al. (1994) stated that "organizational innovativeness represents a latent capability of firms." Similarly, Ahmed & Wang (2004) define organizational innovativeness as "an organization's overall innovative capability of introducing new products to the market, or opening up new markets, through a combination of strategic orientation with innovative behaviour and process." These studies have approached OI from the more scientific method where innovativeness is depicted as any other abilities of an organization such as producing goods, services and thus it can be influenced, improved and increased with proper focus and deliberation. This research adopts this approach of conceptualizing OI and defines organizational innovativeness as the latent capability of an organization to produce innovation over time (Avlonitis et al., 1994; Ahmed & Wang, 2004; Beimborn et al., 2010; Ruvio et. al., 2013).

The section below elaborates the concept of critical success indicator (CSI) and critical failure indicator (CFI) and why it is important in assessing organizational

innovativeness. In addition to that, it also elaborates how such indicators can be developed just by paying more attention inside the organization.

3.2 The concept of CSI and CFI in organizational innovativeness

The very essence of being innovative plants the seeds of innovation inside an organization (Dundon, 2002; Christensen et al., 2011). Innovation by nature is a complex phenomenon that comprises a high level of uncertainty and ambiguity (Schumpeter, 1947; Drucker, 1985; Christensen, 1997; Christensen & Raynor, 2003). Therefore, a way to know whether an organization is pursuing innovation and more precisely pursuing right innovation initiatives in a right way is through properly evaluating and monitoring the pursuit of innovation (Cheyanne & Mark, 2006; Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; David & Epstein, 2014).

In literature, researchers have pointed out a plethora of indicators that inform organizations whether they are good at pursuing and producing innovation. These indicators have been synthesized as critical success indicators (CSI) in this research (also see section 1.2). A well-performing organization matches most of CSIs as these CSI are developed with the help of organizations of such that imitates their DNA. The problem, however, arises when organizations are not being able to compare their indicators with indicators pointed out in literature as they don't exist on the list (Christensen, 1997; Ries, 2011). This leaves organizations stumbling in the act, where the very search for success indicators leads nowhere. For example, companies start brainstorming, implement tools to gather and evaluate ideas, encourage everyone to innovate... etcetera are good success indicators but doing it without knowing where exactly the problem lies in the innovation process leaves organizations with innovation theatre where innovation gets suffocated (Hansen & Birkinshaw, 2007; Blank, 2019). The very act that fosters creativity is destroying innovation in this case because organizations ruthless attachment to success

indicators provide no room for manoeuvre (Christensen, 1997; Hansen & Birkinshaw, 2007; Ries, 2011; Blank, 2019).

The problem with such measures is that they do not have indicators to point out that things are not going well anymore. The sole focus of pursuing success indicators can be referred to as tunnel vision (Kirsner, 2009; May, 2009; Finette, 2013; May, 2018) where sheer determination to achieve audacious goal leads an organization to failure. Consider the following example, Yahoo was one of the Fortune 500 companies that have 21% online advertising market in 2005 positioning itself as a market leader (Vocoli, 2014). Fast forward 10 years and Yahoo is not only on Fortune 500 list but also lost almost all its market share (Vocoli, 2014; Anthony et al., 2018). The problem? Yahoo's relentless pursuit of becoming online portal led them to failure as they discard many apparent opportunities and innovations (Vocoli, 2014). This could have been avoided if there were another indicator type, critical failure indicators (CFI) that showed Yahoo that they are playing outside of their core business strength or they are not pursuing strategic initiatives (e.g. M&A) or the leader is navigating in the wrong direction. But, because there was no such tool that could have informed them about failure indicators, they led to believe that they were moving in the right direction and perhaps even pursuing the right goals and objectives due to their focus on success.

That's why this research aims to synthesize CSI and CFI into the same framework so that an organization can sense, navigate, evaluate and monitor its innovativeness progress from both angles. It's important to note that success indicators are crucial for measuring organizational innovativeness and so does failure indicators. The reason this research has focused on critical success and failure indicators is that indicators are easy to notice, evaluate and monitor (Cheyanne & Mark, 2006). They are effect of what an organization is doing to become innovative and they inform organizations whether they are winning or not (Gilkey, 2012; Marr, 2019).

3.2.1 Dimensions of organizational innovativeness

Regardless of such progress and development in organizational innovativeness conceptualization and differentiation, the measurement instrument seems to follow an approach where innovativeness is measured based on the number of innovation developed or adopted or both (Avlonitiset et al., 1994; Subramanian, 1996; Wang & Ahmed, 2004; Dibrell et al., 2008; Gamal, 2011) when measuring organizational innovativeness as shown in the table below.

Table 4. Measuring innovativeness based on the number of innovations created and/or adopted.

Research	Product	Market	Process	Behavior	Strategic	Business Systems
Miller and Friesen (1983)			√	√	√	
Capon et al. (1992)		√			√	
Avlonitis et al. (1994)	√		√	√	√	
Subramanian and Nilkanta (1996)			√	√		
Hurley and Hult (1998)				√		
Rainey (1999)				√	√	
Lyon et al. (2000)	√		√			
North and Smallbone (2000)	√	√	√	√		
Boer and During (2001)	√		√			√

Wang and Ahmed (2004)	√	√	√	√	√	
Crespell et al. (2006)	√		√			√
Knowles et al. (2007)	√		√			√
Dibrell et al. (2008)	√		√			√

Such approaches measure organizational innovativeness to an extent, nonetheless, they miss the overall dynamics inside an organization that produces innovation (Beimborn et al., 2010; Christensen et al., 2011; Bodell, 2013; Ruvio et. al., 2013). Innovation is the result of internal collaborative effort aligned with external opportunities and thus measuring number of innovations over time in different areas of an organization do not necessarily measure OI as this method exclude the internal effort that brings innovation to life. This is evident in other research as they tend to focus on internal dynamics and process of producing innovation to measure OI in its true sense. For example, Christen et al. (2011) measure organizational innovativeness by measuring the strength of an organization on three dimensions: people, process and philosophy. Similarly, Bodell (2013) measures OI by decoding the strength of an organization on two major pillars: people and organizational behaviour.

As a result, researchers call for a more comprehensive instrument that can capture organizational innovativeness broadly (Ahmed & Wang, 2004; Dibrell et al., 2008; Ruvio et. al., 2013). Therefore, this research has identified 5 dimensions that work together to produce innovation and hence a measurement tool needs to incorporate these dimensions into the same framework to measure organizational innovativeness comprehensively as shown in the table below.

Table 5. Dimensions of organizational innovativeness

Dimensions	Literature
Culture	Christensen, 1997; Edmondson, 1999; Ahmed & Wang, 2003; Christensen et al., 2011; Holman et al., 2011; Bodell, 2013; David & Epstein, 2014; Dayer & Furr, 2014; Couros, 2015; Osterwalder, 2016; Boston, & Zhao, 2017; Price & Toye, 2017; Berry, 2018; Kirsner, 2018; Brem et al., 2019; Goh, 2019.
Leadership	Maxwell, 2007; Christensen et al., 2011; Bodell, 2013; David & Epstein, 2014; Dayer & Furr 2014; Llopis, 2014; Couros, 2015; Boston & Zhao, 2017; Price & Toye, 2017; Kirsner, 2018.
Strategy	Christensen, 1997; Ahmed & Wand 2003; Keller & Price, 2011; Bodell. 2013; David & Epstein, 2014; Price & Toye 2017; Price & Toye 2017; Berry, 2018; Bradley et al. 2018; Kirsner, 2018; Brem et al., 2019.
Structure	Christensen, 1997; Govindarajan & Trimble, 2010; Christensen et al., 2011; David & Epstein, 2014; Dayer & Furr, 2014; Boston, & Zhao, 2017; Berry, 2018.
Execution	Christensen, 1997; Govindarajan & Trimble, 2010; Christensen et al., 2011; Holman et al. 2011; Ries, 2011; Govindarajan & Trimble, 2013; Dayer & Furr, 2014; Boston & Zhao, 2017; Price & Toye, 2017; Berry, 2018.

The table above is prepared from a thorough analysis of literature and acts as a baseline for a diagnostic tool that this research proposes and aims to develop. The next subsection is about connecting dimensions outlined in the table above and the balancing concept established in the previous subsection to build the foundation for a diagnostic tool. I will outline CSI and CFI for all dimensions and demonstrate how the concept of balancing paradigm makes or breaks innovativeness.

3.2.1.1 The role of culture in organizational innovativeness

Culture is one of the key dimensions when assessing organizational innovativeness (Holman, Jaruzelski & Loehr, 2011; Bodell, 2013; Couros, 2015) because it creates a base for organizations to become innovative or degrades it (Boston & Zhao, 2017; Berry, 2018; Kirsner, 2018). Organization's culture is not only a source of sustainable competitive advantage (McLean, Yang & Zheng, 2010) but also a key factor in increasing an organization's innovativeness when used properly (Fischer, Frese, Mertins & Hardt-Gawron, 2018). Because of its critical role in companies' innovativeness, this research aims to explore its contribution to organizational innovativeness from literature with a goal to translate them into critical success and failure indicators for a diagnostic tool.

Organizational culture ties different aspects and parts of the organization together that can act as the fertile soil that gives life to innovative ideas or it can act as a hard ground that thwarts them before they have a chance to grow (Holman et al., 2011; David & Epstein, 2014). For example, consider a university where a librarian comes up with an innovative idea to improve the effectiveness of the university's course offerings. Let's say that she gets a chance to present her idea in front of a board member and management team and she receives an affirmative answer about her idea. The project is assigned to her goals and ambitions list and she is free to pursue it during her working time. What just happened is that she was offered a chance to pursue the idea, but she has not been offered any resources and/or time to do so. In other words, board members and management team often say yes to innovative ideas and underestimates the time, resources, and independence required to pursue them as routine works take over for one reason or another. Such a culture where people who create ideas end up accountable for them but have no resources and time to pursue them will eventually destroy bottom-up innovation (David & Epstein, 2014). Amabile (1998) posits that it is essential that people inside an organization is fueled with proper challenge, freedom, resources, supervisory encouragement, and organizational support.

Holman et al. (2011) identified that the companies that truly are innovative get all the support and back up necessary from their culture. Since innovation is a play that combines uncertainties with the sheer force of action, assumptions and experimentation to produce outcomes (Schumpeter, 1947; Drucker, 1985; Christensen & Raynor, 2003), Edmondson (1999) cites in her research that creating psychological safety in uncertain situation is one of the primary drivers of outcome in organizations. She defines psychological safety as a belief held by people inside an organization that they are safe in interpersonal risk-taking. Similarly, Christensen et al. (2011) add to that that innovative organizations incorporate smart risk-taking as a part of innovation portfolio. Therefore, developing a culture that foster psychological safety at work helps in developing new ideas and realization of such ideas to life. Moreover, some authors suggests that an organization's culture should send the message that everyone is welcomed to raise questions, bring tough issues up, challenge the status quo and have dialogue with a leader and management teams if organizations would like to improve their innovativeness (Bodell, 2013; Brem et al., 2019). In addition to that, Christensen et al. (2011) also outline that innovation must be everyone's responsibility inside an organization to reach a higher level of innovativeness and produce novel innovation.

Furthermore, culture positions an organization to best utilize its knowledge and experience for incremental and radical innovations by leveraging different skill sets that are available in an organization (Ahmed & Wang 2003; Holman et al. 2011). It also helps them devise a course of actions in the face of high uncertainties through collaboration (Ahmed & Wang 2003; Holman et al. 2011; Bodell, 2013). Culture of innovative companies are good at facilitating such process inside the company by putting customer and customer experience as the centre of attention and they are adept learners (Ahmed & Wang 2003; Holman et al. 2011; Couros, 2015; Osterwalder, 2016). They continuously explore new knowledge through research and experimentation where they leverage the community of customers, suppliers, networks etcetera and exploit them to produce innovative products and services (Ahmed & Wang 2003; Holman et al. 2011; Boston, & Zhao, 2017). They question

their own methods, procedures, products, services to bring a new way of doing things that adds more value to companies and customers. Innovative organizations constantly look for ways to make their own business obsolete while other organizations look for ways to sustain themselves (Ahmed & Wang 2003; Osterwalder, 2016). Odor (2019) postulates that organizational culture that values learning can have significantly high organizational innovativeness as such focus result in new knowledge creation.

The table below outlines CSI and CFI for the cultural dimension of an organization. As mentioned in the previous subsection, if an organization is not innovating, then it is stagnating. And that's exactly what the purpose of CSI and CFI are - informing an organization its current state of organizational innovativeness.

Table 6. CSI and CFI for culture

CSI	CFI
An organization looks for ways to make it's own business obsolete (Ahmed & Wang, 2003; Couros, 2015; Berry, 2018).	An organization competes in the market to be better than competitors (Christensen, 1997; Ahmed & Wang, 2003; Osterwalder, 2016; Berry, 2018).
An organisation continually discards things done previously (Ahmed & Wang, 2003; Couros, 2015; Osterwalder, 2016).	People do not tend to abandon current beliefs and methods as long as they seem to produce reasonable results (Ahmed & Wang, 2003; Couros, 2015).
Anyone can bring up problems and tough issues in a formal or informal way (Bodell, 2013; David & Epstein, 2014; Brem et al., 2019).	Diverse inputs or conflicting opinions are not honoured (Bodell, 2013; David & Epstein, 2014; Osterwalder, 2016; Berry, 2018).
It is safe to take smart risks (Edmondson, 1999; Christensen et al., 2011; Couros, 2015).	If I make a mistake on our team, it is held against me (Edmondson, 1999; Berry, 2018).
Failure is investigated thoroughly for learning (Edmondson, 1999; Christensen et al., 2011; Bodell, 2013;	Failure is used to kill the project (Boston, & Zhao, 2017; Goh, 2019).

David & Epstein, 2014; Couros, 2015; Boston, & Zhao, 2017).	
An organization focus on proper challenge or opportunities by delegating resources, freedom, support to people (Amabile, 1998; Christensen et al., 2011; Boston, & Zhao, 2017; Goh, 2019).	Resources, support, and encouragement are delegated to day to day routine work that keeps people busy (Amabile, 1998; Christensen et al., 2011; Bodell, 2013; Dayer & Furr, 2014; Osterwalder, 2016).

A glance on OI with the lens of Hofstede's cultural dimension

National culture system consists of variables such as language, religion, rules and regulations, political system, social organization, history, economy, technology, education, values, attitudes, customs, traditions, the concept of time, music, art and variables of such (Law & Khan, 2018). Similarly, organizational culture comprises of variables such norms, values, rules and regulations, procedures, aspirations and many others that are organizations specific (Law & Khan, 2018). The organization in any country inevitably imitates or influenced by the culture of the country as the organization is a collection of people from that country. For instance, the way of doing things, taking on challenges, solving problems and operating resemble the origin country's culture (Hofstede, 2001; Hofstede, Hofstede & Minkov, 2010). Thus, one can argue that an organization's culture is partially or substantially influenced by the country's culture (Hofstede et al., 2010; Law & Khan, 2018). Research shows that national culture affects the culture of an organization in many ways such as leadership style, managerial decision-making and other practices (Law & Khan, 2018).

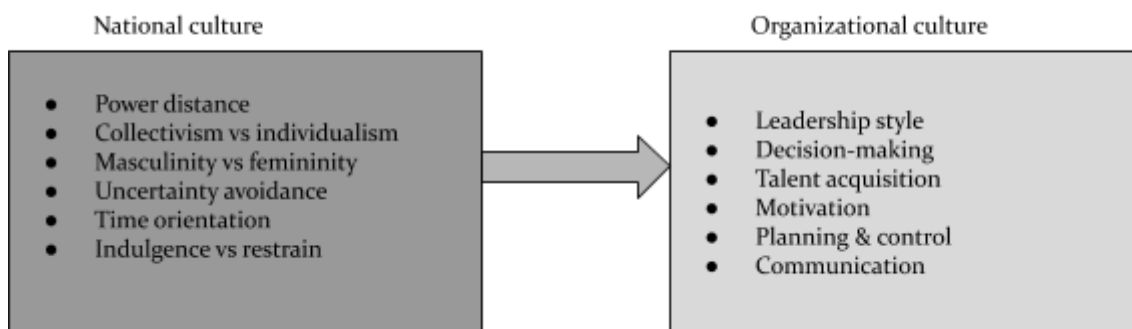


Figure 12. Influence of national culture on organizational culture (modified from Law, & Khan, 2018).

As shown in the diagram above, Hofstede et al. (2010) identified six dimensions of culture: power distance, Individualism vs. collectivism, Uncertainty avoidance, Masculinity vs. femininity, Long-term orientation vs. short-term orientation and Indulgence vs. restraint. Research shows that not all dimensions are relevant in innovativeness study and only a few have a real impact on increasing or decreasing innovativeness level (Strychalska-Rudzewicz, 2015; Strychalska-Rudzewicz, 2016; Manshadi, 2017). Research has identified dimensions such as power distance, individualism vs. collectivism, and long-term vs. short-term orientation are the ones that impact nations' innovativeness (Strychalska-Rudzewicz, 2015; Strychalska-Rudzewicz, 2016; Manshadi, 2017). In addition to that this research has also included Individualism vs. collectivism to explore its impact on organizational culture.

Power distance

Hofstede Insights (2019) defines power distance as "the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally." The belief in such a society is that people should trust leaders blindly and unquestionably (Hofstede et al., 2010, Hofstede Insights, 2019). They further believe that people should not have aspirations beyond their position (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019). This is contrary to innovative organizations. Innovative

organizations aspire their people to innovate beyond what's imaginable and that's how they bring novel innovation to the market. The positive aspects of culture that score high on power distance are that people are loyal and decision making is fast (Hofstede et al., 2010; Dudovskiy, 2017). The negative aspects of high-power distance culture are that they don't encourage bottom-level and junior employees to communicate their ideas and propose initiatives to top-level members (Hofstede et al., 2010; Dudovskiy, 2017). Research suggests that innovative organizations encourage all employees to bring ideas on the table and have dialogue with top-level members to facilitate the adoption of innovative ideas (Bodell, 2013; David & Epstein, 2014; Osterwalder, 2016; Dudovskiy, 2017; Berry, 2018; Brem et al., 2019).

Table 7. Impact of power distance on organizational culture

	Low power distance	High power distance
Management style	Pragmatic	Autocratic or paternalistic
Decision-making	Consensual	Centralized and Individualized seniority oriented
Talent acquisition	Focus on merit and achievement	Focus on connections and references
Motivation strategies	Put emphasis on economic benefits and social recognition respectively	Put emphasis on social recognition and economic benefits respectively
Communication style	Bidirectional: top-down and bottom-up	One directional: top-down

Individualism vs collectivism

According to Hofstede Insights (2019), the core concept that individualism vs collectivism deals with is *“the degree of interdependence a society maintains among*

its members". Individualism is concerned with the self-image of "I" whereas collectivism is concerned with the self-image of "we" (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019). People in individualism society tend to focus on unique skills and ability of each individual whereas collectivism aims to bring the best in every employee through collective focus (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019). Studies suggest that it is important to provide autonomy and freedom to employees in an organization to boost creativity and hence innovativeness (Amabile, 1998).

Table 8. Impact of individualism and collectivism on organizational culture

	Individualism	Collectivism
Management style	Management style in individualism nations ranges from pragmatic to visionary.	Management style in collectivism countries ranges from autocratic, paternalistic to authoritarian.
Decision-making	Decision making tends to be centralized and individualistic.	They prefer consensual decision making.
Talent acquisition	Employees are acquired based on merit and achievement.	Employees in collectivism nations are acquired through connections and references.
Motivation strategies	Individualistic countries economic benefits and social recognition as motivation strategies.	Social recognition and economic benefits are used as motivation strategies.
Communication style	Communication is bidirectional: top-down and bottom-up.	Communication is top-down only.

Uncertainty avoidance

Hofstede Insights (2019) defines uncertainty avoidance as "the extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these". The definition further

implies that the act of creating institutions such as R&D to deal with ambiguous and uncertain situations is the very first foundation for bringing innovation to life. However, this demands rigorous attention as history has shown that too much inclination towards R&D has resulted in at their best as a status quo and at their worst as a complacent culture (Lhuillery & Pfister, 2009; Dayer & Furr 2014). Both types of culture have a negative impact on organizational innovativeness (Bodell, 2013).

Table 9. Impact of uncertainty avoidance on organizational culture

	Low uncertainty avoidance	High uncertainty avoidance
Management style	Autocratic or paternalistic	Pragmatic or visionary
Decision-making	Centralized and Individualized seniority oriented	Consensual
Talent acquisition	Focus on connections and references	Focus on merit and achievement
Motivation strategies	Put emphasis on Social recognition and economic benefits	Security.
Communication style	unformalized communication style.	Formalized communication style.
Planning	Less focus on planning	Rigorous planning

Time orientation

Time orientation is defined as the way society maintain its past links while dealing with the challenges of the present and future (Hofstede Insights, 2019). And the way societies priorities these goals differ based on where on the continuum of this scale they belong (Hofstede Insights, 2019). For example, culture that scores low on this dimension can be referred to as normative culture that sees change with suspicion

and scepticism and favour current time-honoured traditions and norms (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019). Whereas, culture that scores high on this dimension can be referred to as pragmatic society that welcomes change and innovation. They put effort and resources into place to prepare for the future and tackle near term challenges (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019).

Table 10. Impact of time orientation on organizational culture

	Long term orientation	Short term orientation
Management style	Pragmatic	Normative
Decision-making	Centralized and future oriented	Consensual and present time oriented
Talent acquisition	Focus on connections and references	Focus on merit and achievement
Motivation strategies	Put emphasis on social recognition and economic benefits	Security and results.
Communication style	Unformalized communication style.	Formalized communication style.
Planning	Focus on deliberate planning	Rigorous planning

Analysing the impact of Hofstede's cultural dimensions on organizational culture



Figure. Correlational relationship among national culture, organizational culture and organizational innovativeness (Built on the interpretation of Hofstede et al., 2010; Law & Khan, 2018).

The diagram above shows that national culture has a significant impact on organizational culture and thus on organizational innovativeness (Hofstede et al., 2010; Law & Khan, 2018). For instance, nations that score high on power distance dimension prefer authoritarian and autocratic leadership style which implies that communication inside the organization is preferred one directional, that is top to bottom. Culture that scores high on power distance avoid approachability from bottom to top. Research suggests that innovation demands transparent and open communication (Holman et al., 2011; Bodell, 2013; David & Epstein, 2014) and organizations that inhibit such practice obstruct the pursuit of innovation because ideas are not communicating vertically throughout the organization. Furthermore, people are afraid of losing face where opinions from individuals are not welcomed approachability is limited and thus, they would try their best to avoid communicating the new information and/or challenging the status quo (Edmondson, 1999; Bodell, 2013). Therefore, it can be argued that high power distance has negative impact of organizational innovativeness and low power distance has positive impact.

Studies show that ideas are conceived in the mind of individuals that is communicated in the organization that further leverages efforts and knowledge of others which results in a successful innovation (Martikainen, 2017). Individualism culture puts emphasis on individual's strength and knowledge and thus tap into this source of new opportunities that provides base for innovations (Martikainen, 2017). This emphasis further helps in creating a psychological safety in the organization where everyone's opinion is welcomed and listened that results in challenging ways of doing things and thereby applying creativity to generate novel ideas (Edmondson, 1999). Therefore, individualism can have a positive impact on organizational innovativeness whereas, collectivism might have a negative.

The propensity in cultures that score high on uncertainty avoidance is that they resist innovation because they maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. This further implies how difficult it could be to challenge the status quo and talk about disruptive and/or radical idea. Further such culture favours structured rules and regulation as there is an emotional need to assure security among people (Hofstede, 2001; Hofstede et al., 2010, Hofstede Insights, 2019). Research shows that innovation is a result of challenging the conventional rules and regulations and most often innovation is brought forth by breaking and/or adapting some rules and regulation (Kelley & Littman, 2001; Bodell, 2013; European Commission, 2016).

Time orientation influences organizational culture (Hofstede et al., 2010; Law & Khan, 2018) and thus organizational innovativeness (Strychalska-Rudzewicz, 2015; Strychalska-Rudzewicz, 2016; Manshadi, 2017). Studies show that culture that are long-term orientated inclines towards learning from others (Hofstede et al., 2010). Research points out that learning is an important aspect of innovative organization (Odor, 2019) as this results in new knowledge creation and thus novel ideas and innovations (Ahmed & Wang 2003; Holman et al. 2011; Boston, & Zhao, 2017). In addition to that, long-term oriented culture focuses on investing its time and effort to prepare for the future rewards that prepares such culture to welcome change as the situation demands and adapt accordingly. Research outlines that another important quality of innovative organizations is that they welcome change and highly adaptable to melliabile circumstance (David & Epstein, 2013; Price & Toye, 2017). And since long-term oriented culture readily accepts changes, this position them as highly adaptable and thus culture that inclines towards innovation and advancement (Hofstede et al., 2010). This understanding further begets that it is easy to challenge the status quo in long-term oriented culture than short-term oriented culture since change is easily acceptable in long-term oriented society whereas short-term oriented society sees change as a threat (Hofstede et al., 2010). And hence, cultivation of the notion of being innovative is more approachable and straightforward in a long-term oriented culture than short-term oriented.

Furthermore, the fact that being innovative is not considered apprehensive in a long-term oriented society creates a psychological safety net that boosts creativity and innovation in such culture (Edmondson, 1999).

Table 11. Impact of national culture on organizational innovativeness

Cultural dimension	Impact on OI
Power distance	High power distance implies negative impact on OI whereas, low power distance implies positive.
Individualism vs. collectivism	Individualism has positive impact whereas, collectivism has a negative impact.
Uncertainty avoidance	High uncertainty avoidance impact negatively whereas, low uncertainty avoidance impact positively.
Time orientation	Long-term time orientation has positive impact on organizational innovativeness whereas short-term time orientation has negative impact on organizational innovativeness.

3.2.1.2 Leadership role in organizational innovativeness

Peter Drucker said that “Only three things happen naturally in organizations: friction, confusion, and under-performance. Everything else requires leadership” (Yatzeck, 2010; Cates, 2018). Leadership sets the tone for an organization to innovate through forward-thinking ability and commitment to innovation (Mckinney, 2016). Leadership is an essential dimension when assessing organizational innovativeness (Legrand, Weiss, & Weiss, 2011; Mckinney, 2011; Mckinney, 2016; Xiao, Jin, Liang & Qian, 2017) because without it innovation is fragile as an organization lacks the ability to innovate near their core (Barsh et al., 2008; Mckinney, 2011;) that increases the possibility of failure when diffusing innovation (Drucker, 1985). Without the right leader, an organisation becomes either destructive or worse complacent (Bodell, 2013; David & Epstein, 2013). The

first is obvious and easy to determine as it shows its symptoms clearly. The latter, however, is hard to notice and much worse as it kills an organization from the inside out (Bodell, 2013). It takes a strong leader to shape such organizations in the right direction by a constant sheer will, influence and ability (Maxwell, 2007; David & Epstein, 2013; Price & Toye, 2017). Due to its high importance in influencing an organization's innovativeness, I have decided to explore the literature to discover how leadership contributes to organizational innovativeness with a purpose to shape the findings into critical success and failure indicators that would contribute to a diagnostic tool that this research aims to develop.

On one hand, the more able individuals in an organization, the better it is from developing ideas to experimenting, and finally converting them into successful product or service as the proverb says, "*two heads are better than one*" (Christensen et al., 2011; Keller & Price, 2011; Price & Toye, 2017; Cruz-e-Silva, 2019). On the other hand, it is also common that too many people either making decisions or setting a course of direction for an organization lead to nowhere (Geoffrey, 2013) as the old adage says, "*too many cooks spoil the soup*" (Proverbicals.com, 2019). And thus, it makes sense why leadership is a part played by an individual who can navigate through the unknown with absolute confidence and passion that is a starting point for any innovation (Barsh, Capozzi & Davidson, 2008; Llopis, 2014; Cruz-e-Silva, 2019).

Most organizations have moved into a position where execution has become a second nature to them, but not innovation (Govindarajan & Trimble, 2010; Dayer & Furr, 2014; Osterwalder, 2016). This is because execution favours certainty, whereas, innovation is the result of constant wrestling against high uncertainty (Govindarajan & Trimble, 2010; Dayer & Furr, 2014; Osterwalder, 2016; Price & Toye, 2017). Since innovation is often wrapped in high uncertainty, traditional way of decision making through a linear process does not help as variables are unpredictable (Dayer & Furr, 2014; Price & Toye, 2017). Therefore, an innovative organization requires a leadership that foster speed of decision making through

creative assumptions, experimentations and validations of ideas (Ries, 2011; Dayer & Furr, 2014; Llopis, 2014; Price & Toyne, 2017).

One way to assess whether a leader is going to support such process is to evaluate where on the leadership hierarchy a leader belongs as this projects the ability of a leader to influence and inspire others to achieve a common goal and align everyone on the organization's vision (Collins, 2005; Maxwell, 2011; Abraham & Dias, 2014; Dayer & Furr, 2014). An organization can do so by looking at a framework that Collins (2005) identified in his research as shown below:



Figure 13. Hierarchy of leadership level (adopted from Collins, 2005)

The research shows that up to level 4, leaders are highly efficient and drive performance engine to the maximum limit through being a scarce resource, effective team player, organizer and achiever (Collins, 2005 a; Collins, 2005 b; Abraham & Dias, 2014). However, when an organization is aiming to innovate while keeping the performance engine efficient, leaders up to level 4 might not be that effective as their personal ambition, ego, rational fears may hinder such pursuit (Collins, 2005 a;

Collins, 2005 b; Ries, 2011; Abraham & Dias, 2014). Studies show that level 5 leaders are more suited than others to achieve both goals simultaneously as they possess skills, knowledge, ability and humility to put everything aside and do what's necessary to achieve both goals at the same time (Collins, 2005 a; Collins, 2005 b; Abraham & Dias, 2014; Price & Toye, 2017).

The impact of leadership style on organizational innovativeness

The above illustrations of five levels of leadership leads one to ask what type of leadership style belong to level 5? The answer to that question can be identified by first looking into literature on what kind of leadership are there, exploring their impact on performance and innovation of an organization and then finding the empirical evidence that supports such claim.

Leadership is studied and conceptualized from different perspectives such as trait, behaviour, influence etcetera and thus exist many types (Northouse, 2016). Burns (1978) outlined two leadership styles in his classic book: transformational and transactional leadership. Goleman (2011) outlines 6 different leadership styles such as authoritative, coaching, democratic, affiliative, pacesetter and commanding. Similarly, Kesting, Niu, Song & Ulhøi (2015) outlined 7 leadership styles such as directive and participative leadership, interactive leadership, charismatic leadership, transformational leadership, transactional & instrumental leadership, strategic & CEO leadership, and shared & distributed leadership. In addition to that, Goodwin (2019) outlines 4 styles of leadership: transformational, crisis management, turnaround and visionary leadership. There are some similarities and differences among researchers when classifying leadership style, though their classification has a lot in common considering they use different words or synonyms for naming them differently (Northouse, 2016). For example, participative and democratic are not different as both styles put a focus on people and bring consensus among people. Similarly, there isn't much difference between authoritative and transformational as both put emphasis on creating a compelling

new direction and what could be achieved. This research chooses to proceed with Goleman's classification for simplicity and outlines their impact on an organization's innovativeness as shown below in the table below.

Table 12. Impact of leadership style on innovativeness (adopted from Goleman 2011).

Style	Impact
Authoritative	Creates a compelling vision and gives employees reason to innovate.
Coaching	Develops capabilities for the future that helps in executing incremental and radical innovation.
Democratic	Prepares an environment to innovate.
Affiliative	Inspires people to explore and innovate.
Pacesetting	Improves the organization's and employees' performance.
Commanding	Unless an organization is on fire, meaning a turnaround is necessary or hostile takeover is looming, this style has a negative impact on OI.

The table above illustrates that each style has its benefits and should be applied with the context in account (Goleman, 2011; Kesting et al., 2015). Additionally, there is no empirical evidence that shows a particular style is better suited to enhance organizational innovativeness (Kesting et al., 2015). Research further suggests that organizations that achieve great results and keep introducing innovations are those that combine different styles together considering organizational context and goals simultaneously (Goleman, 2011; Kesting et al., 2015; Price & Toye, 2017). For instance, Thorndike (2012) presented a list of CEOs who did an incredible amount of work in driving performance and increasing organizational innovativeness in a completely different way than most of the CEOs of that and recent times. They embodied a different set of leadership style and decision-making approach (Thorndike, 2012).

So, if no particular style suits all and there is no evidence that one is better suited in the context of OI, this brings one to ask how an organization will know which leadership style to adopt when innovating. The answer lies in how innovation is perceived in an organization and what is the organization's core strength. Keller & Price (2011) outlined that an organization's strength lies in one out of four organizational archetypes such as leadership driven, execution edge, market focus or knowledge core. Since this research supports innovation as a process paradigm considering an organization is familiar with its core strength, this research adopts the conceptualization of leadership management style as a process (Northouse, 2016) where an able leader act as situation demand. Dayer & Furr (2014) divide leadership management style for an innovation process into two groups: entrepreneurial and traditional. Entrepreneurial style put emphasis on creativity and novelty, whereas, traditional style focus on execution and continuous improvement. They suggest that a leader must embrace both styles simultaneously to boost innovation inside an organization. Consider the following example, Durant founded GM and when the company started to grow the board members fired Durant saying that he is not a good fit for the company. He again co-founded a company, Chevrolet with another co-founder which GM acquired later. And GM's board member again fired Durant saying that he is not a good fit for the company. This suggests how dynamic and complex innovation is and how it requires different leadership approaches at different stages. It's still arguable whether an entrepreneurial or traditional approach is better. Though the one thing is clear that an entrepreneurial approach is more effective in the early stage and traditional approach is more effective during scaling of innovation as shown in the figure below. (Dayer & Furr 2014: 43-47.)

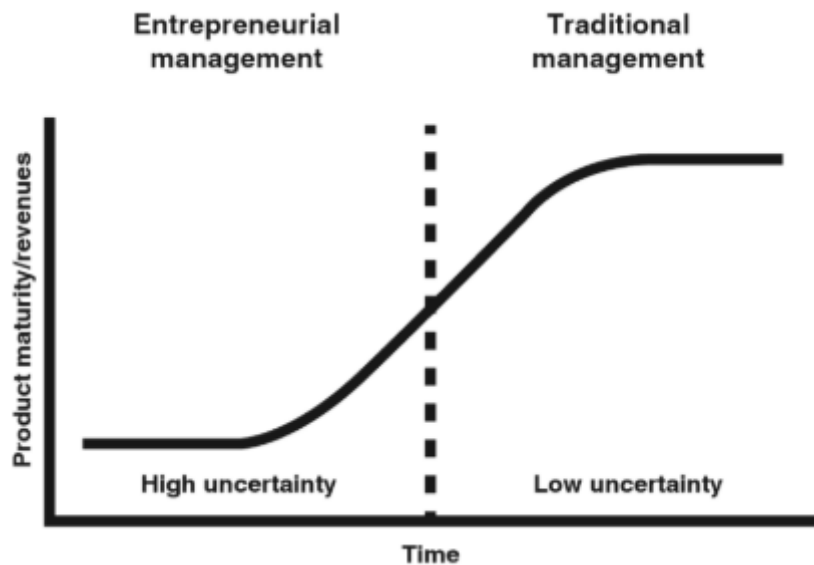


Figure 14. Leadership style (Source: Dayer & Furr 2014)

Thus, it is safe to assume that unless a leader has a keen interest in innovation, innovation will be a myth for the organization as Christensen et al. (2011) posit, it takes an innovative leader to make an organization innovative.

In addition to that, an innovative leader is skilful at crafting and connecting ideas that are not obvious yet by anticipating market volatility, change and competitive threats (Maxwell, 2007; Christensen et al., 2011; Price & Toye, 2017). This is the ability that Maxwell (2007) says it distinguishes a leader from a follower. Such act also requires one to be comfortable with the unknown and ambiguity (Maxwell, 2007; Price & Toye, 2017) that is a bridge for any kind of innovation (Dayer & Furr 2014; Price & Toye, 2017). And creates a compelling vision for the organization to move into that direction (Barsh et al., 2008; Price & Toye, 2017; Kirsner, 2018). This bold move also requires a leader to inspire people inside an organization (David & Epstein, 2014) and provide the necessary resources to explore and experiment (Christensen et al., 2011; David & Epstein, 2014; Price & Toye, 2017; Kirsner, 2018) so that necessary data can be compiled (Dayer & Furr 2014; Osterwalder, 2016; Berry, 2018; Goh, 2019) for prompt decision-making and make necessary changes to develop products and services faster (Price & Toye, 2017).

Additionally, since innovation is a complex process comprised of development and diffusion of innovation, it requires collaboration and cooperation not only inside an organization but also outside of an organization (Christensen et al., 2011; Bodell, 2013; Price & Toye, 2017). An innovative leader steps out of his/her organization and network with people and organizations that are essential for the development and diffusion of innovation (Maxwell, 2007; Christensen et al., 2011; Price & Toye, 2017). Equally important is a leader's trust in employees because even though a leader connects the dots, creates a compelling vision and charts the course of action, a leader needs people who can execute on such vision, perform tasks and develop ideas. Hence, a leader trusts in people around him to craft new products and services by supporting and consulting them throughout the process to enhance organizational innovativeness (Barsh et al., 2008; David & Epstein, 2014; Price & Toye, 2017).

The table below outlines CSI and CFI for leadership dimension of an organization with goals to show how leadership is either helping an organization to become innovative or deteriorating.

Table 13. CSI and CFI for leadership

CSI	CFI
A leader creates a compelling vision and provides reasons to innovate (Barsh et al., 2008; Christensen et al., 2011; Llopis, 2014; Berry, 2018).	A leader is chosen based on experience and lacks aspiration to innovate (Barsh et al., 2008; Christensen et al., 2011; Dayer & Furr 2014; Price & Toye, 2017).
A leader is known for combining unconventional ideas and sources together (Maxwell, 2007; Christensen et al., 2011; Price & Toye, 2017).	A leader is not able to connect emerging events and trends (Barsh et al., 2008; Llopis, 2014; Price & Toye, 2017).
A leader is comfortable with ambiguity and adept at finding winning solutions (Price & Toye, 2017).	A leader lacks the ability to act on signals crucial to the future of the business (Llopis, 2014; Price & Toye, 2017; Kirsner, 2018).

A leader connects beyond hierarchy and leads in a fluid, consultative manner (Maxwell, 2007; Christensen et al., 2011; Bodell, 2013; Price & Toye, 2017).	A leader is known for authority and hierarchy (Maxwell, 2007; Dayer & Furr 2014; Llopis, 2014; Price & Toye, 2017).
A leader Inspires people to explore and experiment (David & Epstein, 2014; Boston & Zhao, 2017; Price & Toye, 2017).	A Leader fears success (Llopis, 2014; Couros, 2015).
An able leader matches resources availability to opportunities (Christensen et al., 2011; David & Epstein, 2014; Price & Toye, 2017; Kirsner, 2018)	Resources are reserved a leader (Price & Toye, 2017)

3.2.1.3 Strategy shapes organizational innovativeness

Organization's strategy is a crucial dimension when measuring innovativeness (Frey, 2009; Stowe & Grider, 2014) because strategy informs the level of success an organization is going to achieve when innovating (Drucker, 1985; de Wit, 2017). Yet, many organisations approach innovation game without any strategy (Pisano, 2015). Some organisations that do have a strategy are struggling to produce innovative results because they deploy already exploited strategy from the past that not only conflicted with the new strategy creation but also misaligned the coordination and efforts of organizational capability (Rumlet, 2011; Pisano, 2015). Organizations trying to innovate outside of the core of the business and holding acute strategy are unlikely to succeed as efforts and focus get misaligned (Drucker, 1985; Rumlet, 2011). Due to its importance in keeping an organization on the course, engaged and effective in the pursuit of innovation (Drucker, 1985; Holman et al., 2011; Govindarajan, 2016; de Wit, 2017), this research investigates literature for the contribution of strategy to organizational innovativeness and aims to round them up into critical success and failure indicators to use them in a diagnostic tool.

Research shows that despite the substantial investment of organizations' resources, talent and management's efforts, enhancing organizational innovativeness remains a daunting task because most often organizations lack a good innovation strategy (Anthony, Eyring & Gibson, 2006; Pisano, 2015; Kirsner, 2018). A good innovation strategy is a set of actions directed to achieve strategic vision and innovation objectives (Rumelt, 2011; Pisano, 2015; de Wit, 2016). Rumelt (2011) states that a good strategy consists of three major components: a diagnosis; a guiding policy; and a set of coherent action as shown in the diagram below.

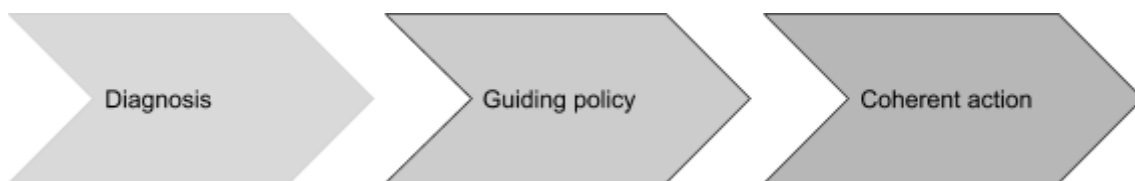


Figure 15. Components of a good innovation strategy (adopted from Rumelt, 2011).

The author outlines that a diagnosis is about identifying the nature of challenge or issue at hand. In other words, trying to grapple with a reality to understand what is going on or what is really happening (Rumelt, 2011). This is where an organization discovers patterns by linking facts about the business, environment, customer, industry and everything else that relates to an organization (Rumelt, 2011). This requires rigorous attention to the details to uncover the present situation in which an organization is operating because this provides background for the next step that an organization will engage in (Rumelt, 2011; Pisano, 2015; de Wit, 2016). Since the point of analysis here is (enhancing) organizational innovativeness, then at the minimum level, the reality can be assessed through careful analysis of an organization's strength, weakness, opportunities and threats. This provides insights into organizational capability, market shift, technological advancement, trends and changes of such. Once the organization identifies the accumulated patterns in the areas of strength, weakness, opportunities and threats, they help organizations in choosing the course of direction that the organization needs to focus on. For instance, identification of a novel opportunity might take an organization in the

direction of disruptive innovation or identification of demand for a quality product might take the organization in the direction of incremental innovation.

Hence, it's important to diagnose the reality at hand accurately to get insights about the next step. Thereafter, organizations would like to inquire how they can assess their current situation considering they are dealing with information overload due to the evolution of technology (Gross, 1964; Toffler, 1970; Edmunds & Morris, 2000). One way to stay focused and informative is through outlining the boundaries for the organization (Keller & Price, 2011; David & Epstein, 2014; Price & Toye 2017; Kirsner, 2018; Cruz-e-Silva, 2019; Garnett, 2019). This act helps organizations easily collect facts and data to reveal the patterns that have been and are accumulating in this area. This result into recognizing problem(s) or need(s) that has no solution yet, jobs that existing customer cannot get done, barriers that constrain consumption, customers that are not served yet and patterns of such (Anthony et al, 2006; Pisano, 2015). In addition to that, the careful analysis of the situation in a set boundaries position diagnosis as an explicit part of a strategy that allows organizations the freedom of flexibility to revisit and change the strategy as circumstances change.

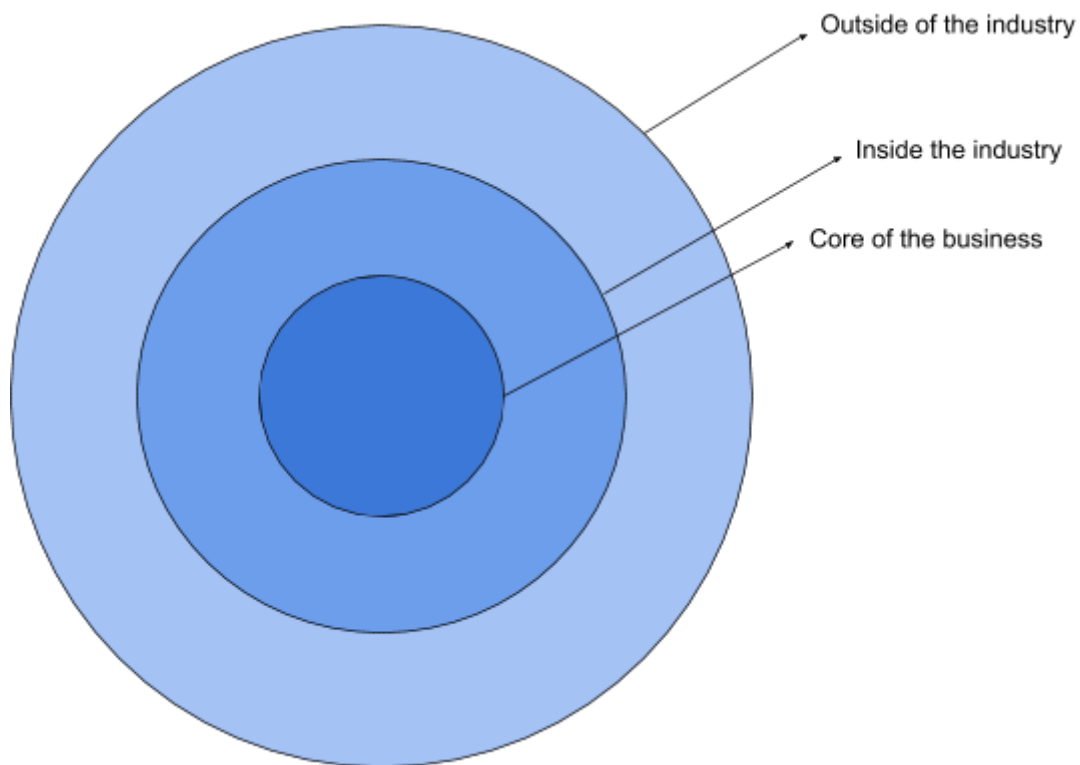


Figure 16. Setting boundaries to play (own interpretation).

Research shows that organizations cite that successful innovations are often produced from or near the core of the business (Anthony et al, 2006). This is because successful innovation requires not only resources but also competences. And competence takes time to accumulate and then be effective (Pisano, 2015). It's known that organizations have limited capabilities (resources and talents/competence) to perform everyday activities (Christensen et al., 2011). And when innovation gets the priority that further demands resources and talents, organizations' need to properly allocate such limited skill forces and resources to create value (Christensen et al., 2011; Keller & Price, 2011). Steve Jobs said, *"Innovation is saying no to 1000 things"* (Zurb, 2019). This signifies how important it is to set boundaries for innovation so that resources and time get utilized in a manner that produces results that are closer to the core of the business (Keller & Price, 2011; David & Epstein, 2014; Price & Toye 2017; Kirsner, 2018; Cruz-e-Silva, 2019; Garnett, 2019).

Rumelt (2011) argues that setting policy is about adopting an overall approach to deal with challenges. In the context of organizational innovativeness, this means defining where an organization is going to play (Anthony et al, 2006; Pisano, 2015). For instance, organizations might focus on creating innovation value that are incremental advances in existing value if the better quality is expected from the organization or a leap in existing value if customer preference is changing (Kim & Mauborgne, 2004). An organization can explore the value landscape by looking at the innovation landscape presented in the diagram below.

The Innovation Landscape Map

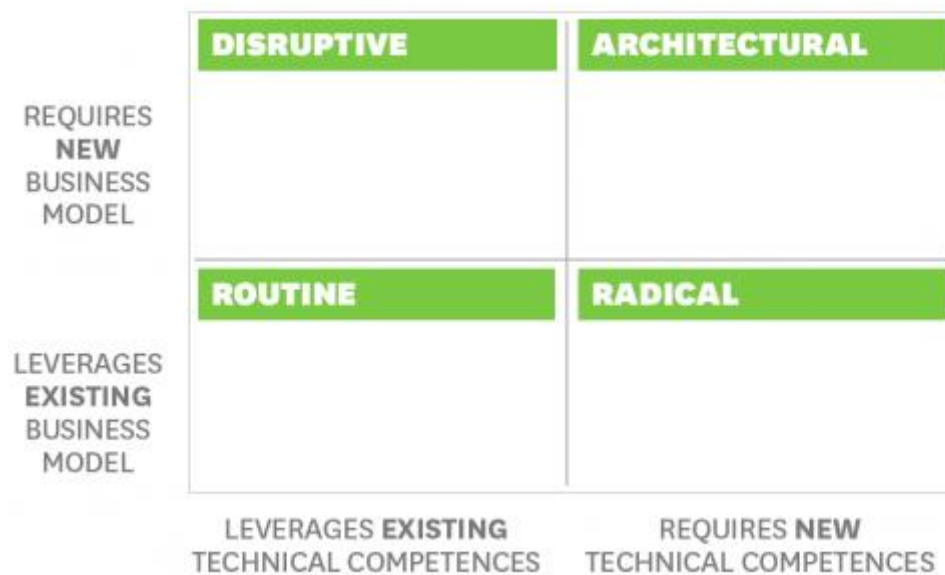


Figure 17. The innovation landscape map (adopted from Pisano, 2015).

The diagram above shows how where organizations aim to play will determine the needed competencies and change in the business model. For instance, if diagnosis suggests that the industry is crowded with me-too products and services and thus new offerings are required to prolong the business lifespan, then the organization might define disruptive quadrant as a playing ground to escape the cut-throat competition. Thereafter, the organization will engage in creating a new business

model by leveraging the existing competencies and providing new offerings. Thus, resulting in the new market (Kim & Mauborgne, 2004). Hence, the strategy helps an organization to adopt an approach that is suitable to their business context to increase organizational innovativeness.

Another vital part of a strategy aimed at enhancing organizational innovativeness is to determine a set of coherent actions (Rumelt, 2011). In other words, how they will play the game to uplift their innovativeness (Pisano, 2015). It is important to remember that it's impossible to outline every step that needs to be taken as the future is unknowable and hard to predict (Rumelt, 2011; Pisano, 2015; de Wit, 2016; Price & Toye 2017). However, a thorough diagnosis of the situation and carefully chosen approach can shed some light on what to do to increase organizational innovativeness. To demonstrate, let's assume that the organization has identified a new pattern that requires a new solution, this would provide an insight to the organization that they might need to initiate in a radical or architectural approach.

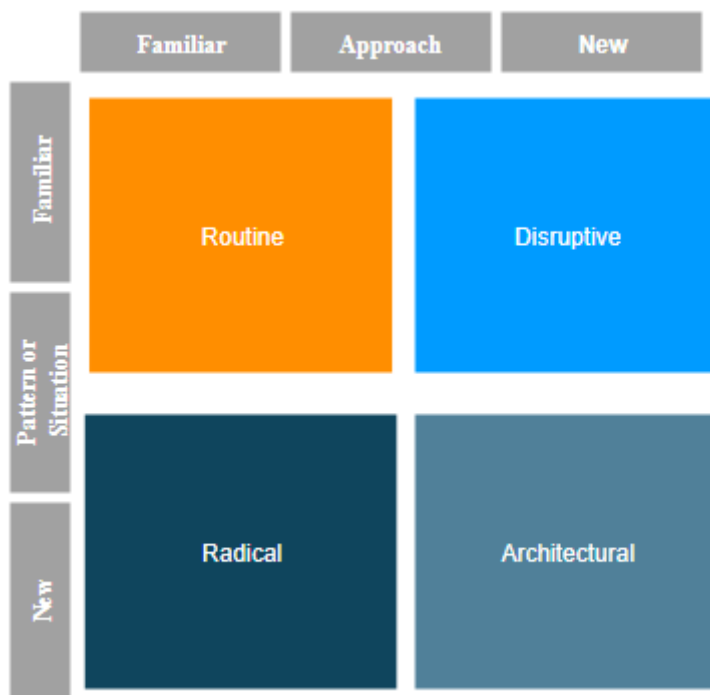


Figure 18. Aligning organization's action (own interpretation).

If an organization chooses to play in the architectural domain, this demands that an organization puts the necessary capabilities (resources and talents) in place to execute this strategy and develop competencies that have not been developed yet as architectural domain requires new competencies and new business model. This will result in growth, profit and organizational sustainability. In other words, gaining organizational innovativeness as the organization intentionally creates new business and thus the new market for the organization. Similarly, if an organization chooses to play in the radical domain, this requires an organization to leverage existing competencies to create a new business model that will result in the new market and/or a new customer base. This requires an organization to move its resources freely inside an organization and coordinate it properly to achieve leverage that facilitates focus and effectiveness required to produce innovative outcomes (Rumelt, 2011; Pisano, 2015; Price & Toye 2017).

The table below outlines CSI and CFI for strategy dimension of an organization that is either driving an organization to become innovative or prohibiting it. And that's why they are put together to measure whether the strategy of an organization is contributing to its OI.

Table 14. CSI and CFI for strategy dimension.

CSI	CFI
A strategy is taken as a journey that is revised and updated frequently (Price & Toye 2017; Bradley et al. 2018).	A strategy is done once a year (Price & Toye 2017; Bradley et al. 2018)
Creating new market opportunities (Christensen, 1997; Ahmed & Wang 2003; Price & Toye 2017).	Competing in the same market (Ahmed & Wand 2003).
Setting boundaries that define fields to explore (Keller & Price, 2011;	Lack of strategic alignment with existing business (Keller & Price, 2011; David & Epstein, 2014; Price & Toye 2017; Berry,

David & Epstein, 2014; Price & Toye 2017).	2018; Kirsner, 2018; Cruz-e-Silva, 2019; Garnett, 2019)
Resources move freely throughout an organization (Price & Toye 2017; Bradley et al. 2018).	Resources are reserved for chosen ideas (Price & Toye 2017; Bradley et al. 2018).
Value innovation is part of the innovation portfolio (Christensen et al., 2011; David & Epstein, 2014; Price & Toye 2017; Brem et al., 2019).	Organizations put an overemphasis on cost-cutting and incremental innovation (Bodell. 2013; Osterwalder, 2016; Berry, 2018).
Developing capability for the future (Ahmed & Wand 2003; Price & Toye 2017).	Organizations focus on creating processes and procedures to enhance efficiency (Bodell. 2013).

3.2.1.4 The role of structure in organizational innovativeness

Usually, a company builds structures to match a company's strategy (Sisney, 2015; Price & Toye, 2017). With time though, a company starts to adapt according to its structure as processes and procedures overtake and strategic decision-making takes place with the structure in mind (Bodell, 2013; Price & Toye, 2017). This puts an organization in a position where either opportunities bypass organization or organization bypass opportunities (Abraham & Dias, 2014; Price & Toye, 2017). In addition to that, developing new ideas become a hurdle to such organizations (Bodell, 2013; Price & Toye, 2017) as innovation initiatives conflict with the existing business (Govindarajan & Trimble, 2010; Keller & Price, 2011; Govindarajan & Trimble, 2013). That's why creating a structure in a way that facilitates innovativeness is essential because innovation is about systematic analysis of opportunities that is organized and performed regularly with a purpose in mind (Drucker, 1985; Govindarajan & Trimble, 2010). Therefore, considering such vital importance of structure during innovation, this research aims to explore this

dimension from literature to develop critical success and failure indicators that will be part of a diagnostic tool that is the goal of this research.

An organizational structure where processes and outputs get priority over culture and inputs respectively have innovation in a chokehold (Bodell, 2013) because such structure focuses mainly on repeatability and predictability (Govindarajan & Trimble, 2010; Sisney, 2015). However, an organizational structure that is agile enough to move resources and talents rapidly with ease helps the organization scale their innovation through collaboration and partnership inside the organization as such organizational structure supports the vision, understands the need and sets clear responsibility, accountability, and key performance indicators for structural change and management (Govindarajan & Trimble, 2010; Keller & Price, 2011; Govindarajan & Trimble, 2013; Sisney, 2015; Price & Toye, 2017).

Development of innovative ideas requires divergent thinking (Dayer & Furr, 2014; Martin, 2015; Manning, 2019) whereas, successful implementation of innovative ideas demands convergent thinking (Govindarajan & Trimble, 2010; Martin, 2015; Manning, 2019). Therefore, innovations that succeed requires an organization structured in a way where divergent and convergent thinking are easily harnessed inside the organization (Dayer & Furr, 2014; Manning, 2019). Divergent thinking does not require many people on the team, rather small manageable team are better suited to take innovation to market (Christensen et al., 2011; David & Epstein, 2014) and having a properly designed organizational structure allows such small team to leverage information and inputs from different functional units to learn and develop market vision competence (MVC) - an ability to connect advanced technologies to future market opportunities (Ahmed & Wang 2003; Dayer & Furr, 2014; de Brentani, Kleinschmidt & Reid, 2014). At the same time, the properly designed organizational structure also allows them to have the necessary autonomy to develop and implement different kinds of innovation - (Ries, 2011; Couros, 2015; Payen, 2017). This further defines accountability and responsibility clearly for teams and puts a proper measurement system in place to measure their

performance (David & Epstein, 2014; Sisney, 2015). The structure also gives birth to dependability inside an organization where the culture of trust gets encouraged and employees can count on each other when innovating (Duhigg, 2016; re:work, 2019).

The table below outlines CSI and CFI for structure dimension of an organization with aims to show how structure either facilitate or prevent an organization to become more innovative.

Table 15. CSI and CFI for structure dimension.

CSI	CFI
A manageable dedicated team is formed to take innovation to market (Christensen et al., 2011; David & Epstein, 2014).	Innovation is part of a performance engine team (Govindarajan & Trimble, 2010; Christensen et al., 2011)
Team designs a process to bring innovation to market (Christensen et al., 2011; Dayer & Furr, 2014; Berry, 2018).	An organization relies on the previous process to bring innovation to market (Christensen, 1997; Govindarajan & Trimble, 2013; Dayer & Furr, 2014).
Collaboration and cooperation are facilitated among innovation team and performance engine (Ahmed & Wang 2003; Dayer & Furr, 2014; de Brentani, Kleinschmidt & Reid, 2014).	Innovation team is completely isolated from the performance engine due to conflicts in interests (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013).
Accountability and responsibility are outlined clearly (David & Epstein, 2014).	Accountability and responsibility are overlapping between the innovation team and performance engine (Ries, 2011; Govindarajan & Trimble, 2013 David & Epstein, 2014).
A scientific approach to decision making (Ries, 2011)	Decision-making process is fuzzy and relies on a sound argument (Ries, 2011; Berry, 2018).
Maintaining innovativeness passion through a performance management system (Ries, 2011; David & Epstein,	Lack of clearly defined innovation metrics (Ries, 2011; David & Epstein, 2014; Berry, 2018).

2014; Boston, & Zhao, 2017; Berry, 2018).	
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3.2.1.5 The directing role of execution in organizational innovativeness

Execution is an essential dimension in evaluating organizational innovativeness (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013) as it determines whether an organization is going to attain its innovation objectives or not (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; Chen, Huang, Liu, Min & Zhou, 2018). Due to its such crucial role in determining innovation success and failure, this research inclines toward exploring this dimension from literature perspective to shed some light on the benefits and drawbacks it presents and then moulds them into needed success and failure indicators for a diagnostic tool that this research intends to develop.

Execution is translating ideas into innovation (e.g. product, service, process, management practice etcetera) that adds value to an organization and its customers (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013). Execution leverages existing resources and talents to support innovation (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; David & Epstein, 2014; Price & Toye, 2017). This is the fuel engine that amplifies creative assumptions in order to decode unknown to known through continuous learning (Christensen, 1997; Govindarajan & Trimble, 2010; Ries, 2011; Govindarajan & Trimble, 2013; Dayer & Furr, 2014).

A leader in organizations sets strategy to innovate near and around the core of the business (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; Dayer & Furr, 2014; The Clemmer Group, 2016; Price & Toye, 2017) that results in a flexible structure that is in harmony with an innovative culture which produce synergistic execution engine to bring innovation to market (Govindarajan & Trimble, 2010; Christensen et al., 2011; Govindarajan & Trimble, 2013; David & Epstein, 2014). This execution approach resembles the core values of the organization but differs in

planning and implementation (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; David & Epstein, 2014; Price & Toye, 2017). This differentiation strategically demands to unlearn certain things such as previous processes and procedures, way of working, financial KPIs etcetera and learn new skills (Ries, 2011; Govindarajan & Trimble, 2013; David & Epstein, 2014; Govindarajan, 2016). The planning process focuses on the disciplined design of experimentation where the goal is to convert unknown into known (Govindarajan & Trimble, 2010; Ries, 2011; Govindarajan & Trimble, 2013; David & Epstein, 2014) because unless unknown are known innovation isn't possible (Govindarajan & Trimble, 2010). Such experimentation puts emphasis on unlearning and learning as unknown realities of innovation demands flexibility because widely imagined assumptions might not work (Ries, 2011; Govindarajan & Trimble, 2013; Govindarajan, 2016). The team builds theory, test assumptions, fails fast with confidence and learn more and iterate the process promptly to accelerate the learning curve and finally bring innovation to the market (Ries, 2011; Govindarajan & Trimble, 2013; Dayer & Furr, 2014; Price & Toye, 2017).

The table below outlines CSI and CFI for execution dimension of an organization. Indicators are put together to reflect the current situation of execution inside an organization in assessing organizational innovativeness.

Table 16. CSI and CFI for execution dimension.

CSI	CFI
The role of innovation is clearly defined inside the organization (Ries, 2011; Berry, 2018).	Clear definition of what innovation really means to an organization is not articulated (Ries, 2011; Berry, 2018).
Experimentation is designed with a vision in mind (Christensen et al, 2011; Ries, 2011; Dayer & Furr, 2014)	A weak or no experimental design and thus killing ideas too soon (Ries, 2011; Boston & Zhao, 2017; Berry, 2018).
Predictions are measured with the help of well-defined innovation metrics	Predictions are measured against performance engine metrics (Ries, 2011; Govindarajan & Trimble, 2013)

(Ries, 2011; Govindarajan & Trimble, 2013).	
Idea adoption and execution time are short (Ries, 2011; Price & Toye, 2017).	Rigorous time-consuming idea adoption and execution process (Ries, 2011; Price & Toye, 2017; Berry, 2018)
Lesson learned is documented and new knowledge is shared inside the organization (Boston, & Zhao, 2017).	No scientific approach to knowledge synthesis (Ries, 2011; Boston, & Zhao, 2017).
Assimilate innovation into the core business (Christensen, 1997; Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013).	Innovation is treated as a separate entity (Christensen, 1997; Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013).

The above developed CSI and CFI for all dimensions of organizational innovativeness will be used in the empirical study with a consideration that they reflect the past activities that might or might not fit into the current business context. Therefore, the empirical study aims to use CSI and CFI developed from the literature review in a way that reflects on what an organization has been doing and where they are aiming to go in order to gain insight into present business context.

3.3 The concept of diagnostic tool

This section sheds light on the concept behind a diagnostic tool that this research aims to develop. It begins with the root of diagnostic tool, meaning how it was developed in the health sector and what is its application in the health sector. After establishing the background of diagnostic tools, it demonstrates how the concept was adopted in organizations, parameter it consists and their applications in organisations. Thereafter, it introduces the concept of a diagnostic tool to organizational innovativeness by combining its usage in the health sector and organizations both.

3.3.1 The usage of the diagnostic tool in the health sector

In the medical industry, the diagnostic tool is used to collect information on the current state of individuals health through questionnaires to identify whether individuals are suffering from any diseases. It usually consists of parameters such as symptoms, conditions, detail and treatment or suggestion (Symptomate, 2019; WebMD, 2019; Wikipedia, 2019).

Gals (2019) posits that a diagnostic tool serves as a decision-making tool for further diagnosis in the healthcare industry. He explains that when a person is suffering from dementia, the earliest diagnosis is performed only after 20 months when symptoms are visible and even then a lengthy process of interview, cognitive test etcetera are performed to establish a treatment/diagnosis process. He postulates that technology could be deployed as a diagnostic tool to perform a pre-diagnosis process based on symptoms and signs. He further suggests that technology-based diagnostic tool saves time, cost and brings underlying issues up in a convenient and intuitive manner as well as provide a way to improve quality of life through regular home-based diagnostic tests. The careful analysis points out three major patterns in the health sector: adopting advanced technology in the diagnosis process, analysis through early signs and symptoms detection and evaluation, and constant investigation to stay on the course (e.g. quality of life).

3.3.2 The application of the diagnostic tool in organizations

The concept of organizational diagnostic tool is very much similar to the concept diagnostic tool in the health sector. One of the main purposes of diagnostic tools in organizations is to focus on identifying gaps between the current state of an organization and what an organization aims to be (Baba, Cherecheș, Mora & Țiclău, 2009). It is mainly deployed during organizational change and/or organizational

development (Creelman, 2012; Morrison, 2012). An HR department or development individual or consultant takes the responsibility of deploying it in an organization (Furgoch, 2016). The benefits of the diagnostic tool is that it breaks down an organization into small components to understand it on more deeper level and visualize these components to see how they all work together in harmony (Furgoch, 2016, McNamara, 2019). This granular and high-level process allows organizations to identify inconsistencies and incongruences in relation to the organization's values and goals (Furgoch, 2016, McNamara, 2019).

There are two different types of diagnostic models that organizations deploy to understand their environment and themselves: open and closed systems (Furgoch, 2016). Open systems embrace the concept of Lewin's field theory which states that *"the totality of coexisting facts which are conceived as mutually interdependent"* (Lewin, p.240, 1951) and Myrdal's principle of cumulative effect which states that, with opposing elements, *"a change in one brings about a change in the other, which in turn brings on more change. The changes may be subtle enough to appear stable in what is actually a constant state of adjustment. Most systems, however, comprise many interrelated elements, making them far more complex"* (Hickman, p. 174, 2010). Open systems infer that all the components of an organization are interrelated and change in one component affects all other components. Open systems consider the environment as an external component to an organization and consider its impact on an organization while implementing changes or making decisions (Furgoch, 2016). It considers inputs components (people, capital, etcetera), internal components (strategy, structure, process, HR systems etcetera) and output components (product, service, advertisements etcetera) into account while deploying such tool (Furgoch, 2016, McNamara, 2019). Whereas, closed systems suggest that an organization is made of its interrelated components and put emphasis on these components while ignoring the external environment (Furgoch, 2016). Closed systems model diagnostic tools mainly focus on internal operating components such as strategy, structure, process, HR systems etcetera when deploying diagnostic tools (Furgoch, 2016, McNamara, 2019). Research shows that

it's imperative to consider organizational diagnostic tool from an open systems point of view as today's organizations cannot grow and thrive without such a view and embracing flexibility and adaptability inside an organization (Kotter, 2012; Furgoch, 2016). Usually, organizational diagnostic tool deployment methods include an in-depth interview, structured interview, survey, observation and analysis of hard data (Furgoch, 2016, McNamara, 2019; The Bridgespan Group, 2019).

3.3.3 Introduction of an OI measurement diagnostic tool

Diagnostic tools are deployed in organizations to identify gaps between the current state of an organization and what an organization aims to be (Baba, Cherecheş, Mora & Ţiclău, 2009). On the other hand, diagnostic tools in the health sector try to focus on bringing the issues up before the usual diagnosis is performed so that the conditions can be detected beforehand and severe health damage can be avoided (Symptomate, 2019; WebMD, 2019; Wikipedia, 2019). Consequently, it can be inferred that an organization uses it to identify the gaps and shortcomings so that they can develop the necessary capabilities to reach their vision and goals whereas the healthcare uses it to prevent diseases to become severe through symptoms identification and matching. It would make intuitive sense to choose one approach over another due to already existing literature and development of diagnostic tools in organizations' sector as it would reduce complexity. In contrast, this research combines both approaches in a framework where it assesses organizational innovativeness based on CSI and CFI (similar to symptoms identification and matching) and provides suggestions on how and where to improve (gap) to enhance organizational innovativeness.

The aims of this diagnostic tool are to identify the current level of organizational innovativeness based on CSI and CFI as inputs in all dimensions as outlined in section 3.2.1. This would require collecting data from the organization which is

subject of diagnosis. This tool will gather data through a survey. Moreover, it is possible to input data through various methods such as structured interviews, in-depth interview, observation, and method of such. This further provides an opportunity to look into details to study what causes the current level of organizational innovativeness and identify dimensions that require improvement. This granular form of investigation and analysis results in preparing suggestions and solutions that would enhance their organizational innovativeness.

3.4 A theoretical framework for assessing OI

Organizational innovativeness is a latent capability of an organization that produces innovation continuously over time (Avlonitis et al., 1994; Ahmed & Wang, 2004; Beimborn et al., 2010; Ruvio et. al., 2013). Most of the studies until now have focused on the number of innovation developed and/or adopted, environment and climate, process or strategic focus on innovation and sometimes combination of a few when assessing organizational innovativeness (Subramanian, 1996; Ahmed & Wang, 2004; Hult et al., 2005; Dibrell et al., 2008; Clayton et al, 2011; Gamal, 2011; Ruvio et. al., 2013). Such focus on measuring organizational innovativeness invariably miss the essence of OI as it is a result of becoming innovative in all aspects of organization. As a result, this research has identified 5 crucial dimensions that an organization needs to focus on to improve its organizational innovativeness as shown in the diagram below.

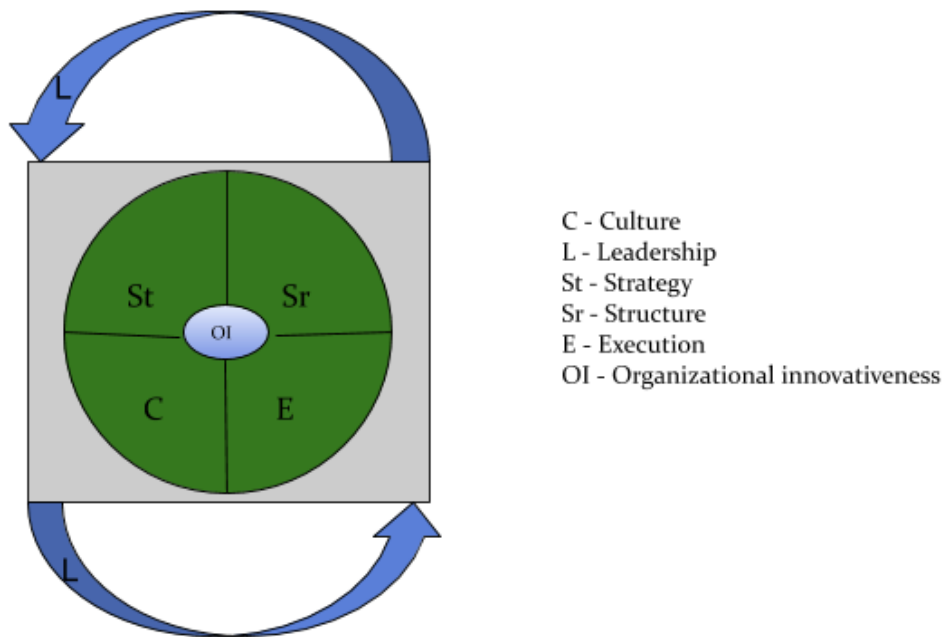


Figure 19. OI as a result of combined efforts from all dimensions.

At the same time, even though some research focus on a few dimensions at a time, they tend to use only critical success indicator (CSI) to measure OI (Subramanian, 1996; Ahmed & Wang, 2004; Hult et al., 2005; Dibrell et al., 2008; Clayton et al, 2011; Gamal, 2011; Ruvio et. al., 2013). In other words, they make what must be done to pursue innovation and measure innovativeness as a focal point of an organization. As a result, organizations overlook their blind spots that not only hinders the pursuit of innovation but stagnates the overall growth (Kirsner, 2009; May, 2009; Finette, 2013; May, 2018) and thus organizational innovativeness (Christensen, 1997; Hansen & Birkinshaw, 2007; Ries, 2011; Blank, 2019). Therefore, this research introduces another type of indicator in addition to CSI, critical failure indicator (CFI) that helps organizations to look for those blind spots. In addition to that, CFIs also help organizations balance what must be done to increase OI with what must not be done or prevent to achieve ideal OI level. This research assesses OI based on the framework shown in the table below that incorporates both CSIs and CFIs.

Table 17. A framework to measure OI.

Dimensions	CSIs	CFIs
Culture	<p>An organization looks for ways to make its own business obsolete.</p> <p>An organisation continually discards things done previously.</p> <p>Anyone can bring up problems and tough issues in a formal or informal way.</p> <p>It is safe to take smart risks.</p> <p>Failure is investigated thoroughly for learning.</p> <p>An organization focus on proper challenge or opportunities by delegating resources, freedom, support to people.</p>	<p>An organization competes in the market to be better than competitors.</p> <p>People don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results.</p> <p>Diverse inputs or conflicting opinions not honoured.</p> <p>If I make a mistake on our team, it is held against me.</p> <p>Failure is used to kill the project.</p> <p>Resources, support, and encouragement are delegated to day to day routine work that keeps people busy.</p>
Leadership	<p>A leader creates a compelling vision and provides reasons to innovate.</p> <p>A leader is known for combining unconventional ideas and sources together.</p> <p>A leader is comfortable with ambiguity and adept at finding winning solutions.</p>	<p>A leader is chosen based on experience and lacks aspiration to innovate.</p> <p>A leader is not able to connect emerging events and trends.</p> <p>A leader lacks the ability to act on signals crucial to the future of the business.</p> <p>A leader is known for authority and hierarchy.</p>

	<p>A leader connects beyond hierarchy and leads in a fluid, consultative manner.</p> <p>A leader Inspires people to explore and experiment.</p> <p>A leader matches resources availability to opportunities.</p>	<p>A Leader fears success.</p> <p>Resources are reserved a leader.</p>
Strategy	<p>A strategy is taken as a journey that is revised and updated frequently.</p> <p>Creating new market opportunities.</p> <p>Setting boundaries that define fields to explore.</p> <p>Resources move freely throughout an organization.</p> <p>Strategies are formulated based on inputs from both the bottom and top levels.</p> <p>Value innovation is part of the innovation portfolio.</p> <p>Developing capability for the future.</p>	<p>A strategy is done once a year.</p> <p>Competing in the same market.</p> <p>Lack of strategic alignment with an existing business.</p> <p>Resources are reserved for chosen ideas.</p> <p>Executive teams formulate strategies based on financial data.</p> <p>Organizations put an overemphasis on cost-cutting and incremental innovation.</p> <p>Organizations focus on creating processes and procedures to enhance efficiency.</p>
Structure	<p>A manageable dedicated team is formed to take innovation to the market.</p>	<p>Innovation is part of a performance engine team.</p>

	<p>Team designs a process to bring innovation to market.</p> <p>Collaboration and cooperation are facilitated among innovation team and performance engine. A scientific approach to decision making.</p> <p>Accountability and responsibility are outlined clearly.</p> <p>Maintaining innovativeness passion through a performance management system.</p>	<p>An organization relies on the previous process to bring innovation to market.</p> <p>Innovation team is completely isolated from the performance engine due to conflicts in interests</p> <p>The decision-making process is fuzzy and relies on sound argument.</p> <p>Accountability and responsibility are overlapping between the innovation team and performance engine.</p> <p>Lack of clearly defined innovation metrics.</p>
Execution	<p>The role of innovation is clearly defined inside the organization.</p> <p>Experimentation is designed with a vision in mind.</p> <p>Predictions are measured with the help of well-defined innovation metrics.</p> <p>Idea adoption and execution time are short.</p> <p>Lesson learned is documented and new knowledge is shared inside the organization.</p> <p>Assimilate innovation into the core business.</p>	<p>Clear definition of what innovation really means to an organization is not articulated.</p> <p>A weak or no experimental design and thus killing ideas too soon.</p> <p>Predictions are measured against performance engine metrics.</p> <p>Rigorous time-consuming idea adoption and execution process.</p> <p>No scientific approach to knowledge.</p> <p>Innovation is treated as a separate entity.</p>

This framework allows organizations to assess their OI at any given time and regardless of the current situation of organizations and marketplace. For instance, if an organization is growing, then such an organization can use it to further improve its organizational innovativeness. And if an organization is in stagnation or declining situation, then such organization can utilize it to identify the source (s) of problem inside an organization and develop improvement plans to strengthen OI.

4 Empirical Study

This chapter discusses the approach and strategy used to collect, sort and analyse empirical data that are the backbone of the main assumptions and conclusions of this research. This chapter further presents the method to deploy a diagnostic tool in an organization and concludes the chapter by demonstrating the reliability and validity of a developed tool through a practical implementation of the tool.

The research questions of this study are, 'What is the current state of innovativeness measurement in technology companies? How can a diagnostic tool help to ensure growth and success for technology companies?' This research further breaks down these research questions into three main objectives to simplify the identification and evaluation process for a set of critical success indicators (CSIs) and critical failure indicators (CFIs) for technology companies to be innovative and determine how innovative technology companies position themselves to ensure growth and success in the marketplace. And finally, develop a tool that can be adopted by technology companies to measure their innovativeness successfully.

This study applies mixed method approach in answering the outlined questions. The qualitative research helped in synthesizing the literature in the field of organisational innovativeness to identify a set of CSIs and CFIs. Similarly, the aim with the quantitative research is to meet the other two objectives set for this research, that is to validate and re-examine the concepts extracted from the literature and to demonstrate the feasibility and practicality of the diagnostic tool.

4.1 Data collection

In the social sciences research, literature review has a vital role in the development of measurement tool, which are collections of items that reveal the level of an

underlying theoretical variable (DeVellis, 2017). However, not all items collected through the literature review can become the part the final diagnostic tool (Netermeyer, Bearden, & Sharma, 2003; DeVellis, 2017). Therefore, data collection from a selected population is paramount to establish the indicators that measure the latent variable in its true sense (Netermeyer et al., 2003; DeVellis, 2017). And hence, this research utilizes three methods to collect primary data in Finland: focused group, semi-structured interview and survey.

First, this research applies focused group method by bringing experts in the field and non-experts (e.g. professors and managers) together. The purpose behind doing so is to maximize the content validity and generalizability of the diagnostic tool (Churchill, 1979; Netermeyer et al., 2003; Greener & Martelli, 2015; DeVellis, 2017). This study aims to measure the relevance of indicators, clarity and conciseness and untapped phenomenon with the help of experts (Churchill, 1979; Netermeyer et al., 2003; DeVellis, 2017). Similarly, the aim with non-experts is to gain insight into usability, appropriateness and applicability of indicators (Greener & Martelli, 2015). This study will be conducted in person by inviting experts and non-experts to an appropriate place.

Secondly, semi-structured interview will be conducted to complement the focus group study and to delve deeper into the views, experiences, beliefs and/or motivations of individuals who are inside and outside a business to gain a deeper understanding of innovation and organizational innovativeness (Gill, Stewart & Treasure, 2008; Morgan, 2016). Furthermore, this will also help in decoding organizational dynamics towards innovation. Moreover, this will help in understanding comparing and contrasting a framework developed through literature review.

Thereafter, a survey will be conducted among Finnish technology companies to test the usability and validity of a diagnostic tool. Survey provides a triangulation to this research as qualitative study has been done in literature review (Greener & Martelli,

2015) as well as a focus group study. And by combining quantitative data from survey will enrich and confirm the concept of this research (Greener & Martelli, 2015). In addition to that, survey will further aid on verifying the concept built in literature (Greener & Martelli, 2015) and refined after focus group study. A questionnaire is designed considering the objectives of this study to collect the primary data among technology companies in Finland based on the indicators developed through a literature review (see appendix 19). The scale for the survey is chosen as likert scale measurement format due to its relevance and appropriateness to this research (Netermeyer et al., 2003; Greener & Martelli, 2015; DeVellis, 2017). This likert scale contains three numeric values 1, 2 and 3 and suggests indicator as mildly, moderately, and strongly present respectively as shown in the diagram below.

Table 18. Defining the scale measurement.

Scale	Value
3	Indicator is strongly present
2	Indicator is moderately present
1	Indicator is mildly present

4.2 Analysis

This section will provide insights into how organizational innovativeness can be assessed by incorporating CSIs and CFIs in the same framework. In addition to that, the aim of this phase will be to present the current innovativeness level of an organization and delve deeper to illustrate the further implications of a measured innovativeness level and how it can be improved.

4.2.1 Result of focus group study

Focus group study is a qualitative approach used by researchers to gain insights into the subject of research from the assembled group of people (Derrick, Mukherjee, Ochieng & Wilson, 2018). The popularity of focus group study rose with the increasing use of participatory research methods among researchers (Derrick et al., 2018). This technique allows researchers to collect qualitative data and acts as a bridging strategy for scientific research and local knowledge (Cornwall & Jewkes, 1995; Derrick et al., 2018). This technique is perceived to be affordable, flexible, and efficient (Derrick et al., 2018). One of the main benefits of using focus group study is that it generates collective views and the actual meanings that lie behind those views (including their experiences and beliefs) on a research topic (Derrick et al., 2018). In addition to that, a researcher also uses focus group study to explore a subject, gather critical information or narratives for further usage in the latter stages of the research (Hamm, Stolz, & Zander, 2013; Derrick et al., 2018).

Focus group study differs from interviews especially the semi-structured “one-to-one” and “group interviews” in a way that it is not only concerned with a discussion between group and researcher but it also lets the discussion among group members happen (Parker & Tritter, 2006; Derrick et al., 2018). This approach is not common where it raises group members’ expectations that cannot be achieved (Baker, Harrison, Milner-Gulland, & Twinamatsiko, 2015; Derrick et al., 2018). Similarly, the technique is also not adopted if there are chances of biasness among group members. Furthermore, it is also avoided where statistical data is required because

it only produces qualitative insights and depth into a topic (Bloor, Frankland, Thomas, & Robson, 2001; Derrick et al., 2018).

The author contacted 13 individuals (see Appendix 1 and 2) to participate in the focus group study. However, due to time constraint and other factors, only four participants were able to participate in the focus group discussion (see Appendix 1) that lasted for approximately one and half hours. Research points out that 8-10 participants are ideal for focus group discussion (Derrick et al., 2018). Nevertheless, it has not been cited in research that less than 8 participants are not acceptable or invalid. This study tried to avoid or limit as many disadvantages or barriers as possible by bringing a diverse group of people together. The diverse background, experience, knowledge and perspective of participants have produced valuable insights and depth into the topic.

The following paragraphs are going to delve into questions presented to the focus group discussion and summarized answers from all participants:

What is your experience with tools that measure organizational innovativeness?

Most of the participants have tested or were familiar with such tools, however, they posited that organizational innovativeness cannot be measured with existing tools because the word measurement implies creating classes/categories based on nature and behaviour of variables to quantitatively measure a unit of analysis (that is an organization in this context) which is not possible in the case of organizational innovativeness as organizational innovativeness is a dependent variable. Therefore, tools that claim to measure organizational innovativeness have some serious reliability and validity aspects to consider.

Similarly, they also confirmed that most of the existing tools rely mainly on only one perspective, critical success indicators. In other words, what an organization should do that would lead them to produce more innovation.

How would you diagnose innovativeness in an organization?

One theme that emerged from the discussion is that innovativeness is more subjective than objective and therefore, it can be diagnosed with the help of qualitative and quantitative questionnaires developed from the literature. Furthermore, a good amount of data collected from organizations by utilizing such developed questionnaires will further help a researcher identify correlation among different indicators that would help in deciding what indicators to include and what to exclude from the final diagnostic tool.

Another theme which emerged during the discussion was that it could also be mapped to observe the current innovativeness of an organization. This, however, is a tool in itself rather than a framework that this research aims to develop.

Do you think diagnosing an organization to assess innovativeness by combining two different perspectives in a single framework would add value?

All the participants agreed that diagnosing an organization to assess innovativeness by combining two different perspectives in a single framework would add value. They compared this approach with an adage *“two heads are better than one”* (Banissy & Kanai, 2010). For example, in general, it is commonly observed that one does things that bring desired results (e.g. success). Similarly, it is also observed that one avoids that produces negative results or causes pain such as one tends not to touch a hot oven because one knows that it will burn one’s hand (negative result/pain). In a similar way, participants posited that diagnosing an organization by bringing two different perspectives (synthesized as CSI and CFI in this research) together might be better than diagnosing an organization through a single perspective (synthesized as CSI in this research) to assess organizational innovativeness.

In summary, focus group discussion points that tools that are designed to assess organizational innovativeness should opt approaches such as diagnosing rather

than measurement. Furthermore, participants postulated that creating a framework by combining two diverse perspectives into a single framework to diagnose organizational innovativeness will bring value to organizations.

4.2.2 Result of semi-structured interview

Qualitative interview research is generally implemented to explore the views, experiences, beliefs and/or motivations of individuals on specific subjects (Gill, Stewart & Treasure, 2008; Morgan, 2016). There are three types of research interviews: structured, semi-structured and unstructured (Gill et al., 2008). A structured interview is conducted for a specific subject with closed questionnaire whereas unstructured interview is conducted without almost no questionnaire where an interview is facilitated as conversation based on interviewee's response to getting to the depth of the subject (Gill et al., 2008). Semi-structured interview combines the approach of structured interview and flexibility of unstructured interview with a goal to get deeper insights into the subject (Gill et al., 2008; Hatry, Newcomer, Wholey, 2015; Morgan, 2016).

This research aimed to gain deeper insights into the subject of the study so I decided to conduct a semi-structured interview as this would provide the necessary flexibility and structure during interviews to explore the depth of interviewee's views, experience, and motivation. The interview questionnaire was prepared in advance to test the authenticity, validity and contextual alignment to the study. There were six questions in total where 3 questions were adopted from the previous focus group study and 3 new questions were added (see Appendix 5) to provide context to the interviews without deliberately outlining the objectives of the research with the help of literature.

I contacted 8 individuals for this semi-structured interview out of which 5 agreed to participate in the interview (see appendix 4 and 5). Three interviews out of 5 were

conducted in person which was recorded with the permission of participants for further investigation and analysis. Similarly, the other 2 interviews were conducted online via Zoom. These two Zoom interviews were recorded as well with the permission of participants for further analysis (see appendix 3 for more detail).

The next few paragraphs are concerning semi-structured interview questions and answers. The answers are a summary of all interviewees' view, experience, direct answers and my observations.

How do you innovate? What does innovation look like in your company?

There are as many ways as individuals on this planet to innovative and this was evident in the research interview. Interviewees defined innovation as objective and incremental as automation, out of the box approach and as subjective and disruptive as inner will, mindset and new solutions.

Some interviewees argued that research, time to explore and openness are keys to produce more innovation. In addition to that, some see audacious goals infused with failures and positive criticism are necessary for innovation. According to middle management level interviewees, on a granular level bringing automation in the business world combined with simplicity and fewer errors is also one form of innovation in this digital world,

How does your innovation stack up against your main competitors and within your industry?

Interviewees argued that it's hard to compare innovation head to head with competitors as even though it seems that companies are doing the same thing, usually the approach and ways of doing things are different and therefore the end outcomes (e.g. from the quality of products to innovative level).

One peculiarly interesting thing that I observed during interviews is that no company calls itself as less innovative than competitors. Rather, they see what they bring to the market is novel and helpful for the customer.

Furthermore, some interviewees also outlined that bringing best practices from the industry to the company is also a sign of being innovative. According to them, this suggests that they are open and willing to change to do things in a better and innovative way.

What is your experience with tools that measure organizational innovativeness? Do you think organizational innovativeness can be measured?

3 out of 5 interviewees have almost no direct experience with tools intended to provide insights into organizational innovativeness. However, they posited that they use retrospective meetings, feedback sessions, surveys designed to gain insights into internal stakeholders' engagement and satisfaction as tools and/or approaches to strengthen organizational innovativeness.

Two interviewees, on the other hand, had experience with tools that measure organizational innovativeness. And they argued that such tools cannot measure organizational innovativeness as innovativeness is a dependent variable. They further argued that tools that provide qualitative insights are rather more fruitful as they bring unseen issues to the surface and hence help managers to tackle these issues to enhance the innovativeness of the company. Even the interviewees who did not have direct experience with innovativeness measuring tools argued that one can does not measure innovativeness exactly due to its nature but can estimate its level in the range.

How would you diagnose innovativeness in an organization?

One theme that appeared during the interview was that organizational innovativeness can be diagnosed by looking into internal stakeholders (e.g.

investors, employee etc.) culture and execution process of the organization in conjunction with the overall mindset of the people in the organization.

Another theme that emerged during the interview was that some leaders diagnose organizational innovativeness subjectively as opposed to objectively by looking at people, their experience and their personality in conjunction with setting audacious goals and evaluating their performance and effectiveness.

Do you think diagnosing an organization to assess innovativeness by combining two different perspectives in a single framework would add value?

All the interviewees agreed that diagnosing an organization to assess innovativeness by combining two different perspectives in a single framework would add value. Some of them compared it to organizational strategic planning to highlight the value. They argued that it would be valuable for them to have two different perspectives to look at the organization as they tend to evaluate things objectively to create a strategy and implementation plans and having more than just one lens to look through will provide rich and sound information that they can use as a base for further strategy formulation. In a similar way, diagnosing organizational innovativeness by combining two different perspectives in a single framework might provide a better and richer result.

They further added that organizational analysis is made by drawing upon the multitude of databank an organization has (information processing capacity, experience, knowledge base etc.) and having a tool that helps in collecting such data from two different perspectives (CSIs and CFIs) on a single unit of analysis will certainly enrich the databank and thus help in providing a better diagnosis report. And so does in the context of organizational innovativeness.

4.2.3 Survey

A survey was created to test the feasibility and reliability of a diagnostic tool formulated in this research. A survey was designed to capture perception of organizations' internal stakeholder so that organizational innovativeness for organizations can be estimated.

The analysis that is presented here is based on a simple rule of thumb: higher or lower the strength of an indicator, more attention should be paid to that indicator to leverage and/or improve to increase the overall level of innovativeness. In other words, if CSIs have higher scores or CFIs have lower scores, then it's good for an organization and an organization should leverage it to its advantage to increase organizational innovativeness. However, if CSIs have scored low or CFIs have scored higher, then it is good for an organization to pay attention to such indicators and make positive continuous improvements to enhance organizational innovativeness.

Table 19. Matrix form of CSI & CFI.

CSI's score		CFI's score		
		1	2	3
		Mild	Moderate	Strong
1	Mild	(1,1)	(1,2)	(1,3)
2	Moderate	(2,1)	(2,2)	(2,3)
3	Strong	(3,1)	(3,2)	(3,3)

4.2.3.1 Data analysis for company A

Due to the confidentiality matter, the name of the company has been changed to Alphabet. Although the detailed report was submitted to the company A, this thesis only presents the summarized results of the analysis to elaborate the concept and shed some light on how the results can be interpreted and implemented in real life.

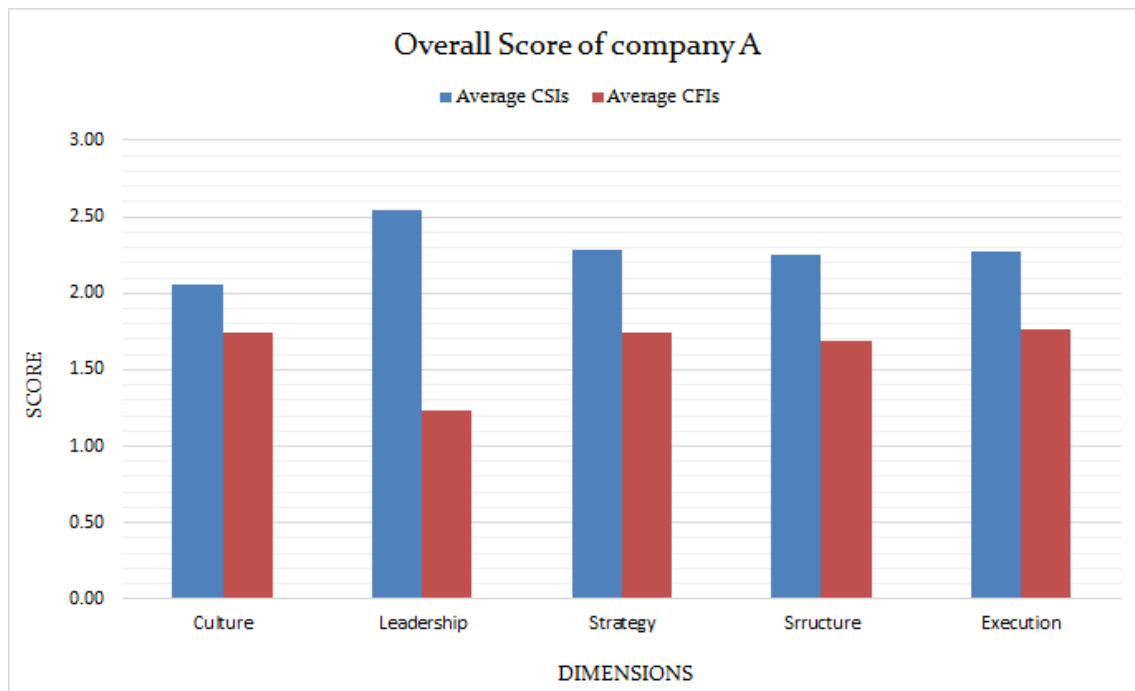


Figure 20. Average score of company A on the five dimensions

The Figure above shows the intensity of CFIs (average score) and CSIs (average score) for all five dimensions: culture, leadership, strategy, structure and execution. The average value of CSIs on the culture dimension suggests that the company is doing relatively well on this dimension as it has scored 2.05. However, the average value of 1.74 for CFIs suggests that there are some issues such as the company's sole focus on competition, People don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results etcetera (see appendix 8 for more CFIs) that are undermining the company's innovativeness. Similarly, the leadership score of 2.55 and 1.23 on CSIs and CFIs side informs that the company has a good

hold on leadership dimension. They are doing things that are necessary to achieve organizational innovativeness. Although the company has scored almost the same score as leadership on the CSIs side of strategy, the increasing score of CFIs's side in the strategy dimension requires more attention. The company has scored almost equal score on structure and execution dimensions with a healthy score on CSI side as well as on the CFI. A healthy score on the CSI is a good sign that the company is progressing towards higher innovativeness level, however, a healthy score on CFI suggests that the company is lagging or not paying enough attention to this side which might weaken the overall innovativeness of the company.

Let's plot the scores of company A in the matrix depicted in table X to analyse how the company is spread in matrix grid and to see where the company is now.

Table 20. Company A on the matrix.

CSI's score		CFI's score		
		1	2	3
		Mild	Moderate	Strong
1	Mild			
2	Moderate	Culture	Strategy; Structure; Execution	
3	Strong	Leadership		

The matrix above suggests that the company is leaning toward the path that won't produce innovative results that the company aims for because three out of 5 dimensions are in the moderate grid which suggests that CSIs and CFIs are both moderately intense and one can easily overpower the other. This is the evolutionary nature of the economic system (Koch, 2014). Meaning without proper measures,

CFIs will overpower CSIs with time that will decrease the innovativeness of the company dramatically. In addition to that, strategy is the threshold between success and failure when innovating (Drucker, 1985; de Wit, 2017) and without it innovation is merely possible (Rumlet, 2011; Pisano, 2015). Similarly, structure can facilitate or stagnate the innovative initiatives (Govindarajan & Trimble, 2010; Keller & Price, 2011; Bodell, 2013; Govindarajan & Trimble, 2013; Price & Toye, 2017). If used well, structure can nourish, develop and scale innovation with speed and agility and if undermined, this can put innovation in a chokehold (Govindarajan & Trimble, 2010; Keller & Price, 2011; Govindarajan & Trimble, 2013; Bodell, 2013; Sisney, 2015; Price & Toye, 2017). Furthermore, execution has also a vital role in enhancing an organization's innovativeness (Govindarajan & Trimble, 2010; Govindarajan & Trimble, 2013; Chen, Huang, Liu, Min & Zhou, 2018). It acts as a fuel or fume depending on how it is used in an organization to facilitate innovativeness. As the old adage says "*An Ounce of Prevention Is Worth a Pound of Cure*" (Price & Toye, 2017). Therefore, the company is advised to take corrective continuous improvement steps that will help the company to improve its innovativeness. For example, the company is advised to put effort in strategy, structure and execution dimensions to uplift CSIs' score and reduce CFIs score to increase overall innovativeness of the company.

4.2.3.2 Data analysis for the company B

Due to the confidentiality matter, the name of the company has been changed to Alphabet. Although the detailed report was submitted to the company A, this thesis only presents the summarized results of the analysis to elaborate the concept and shed some light on how the results can be interpreted and implemented in real life.

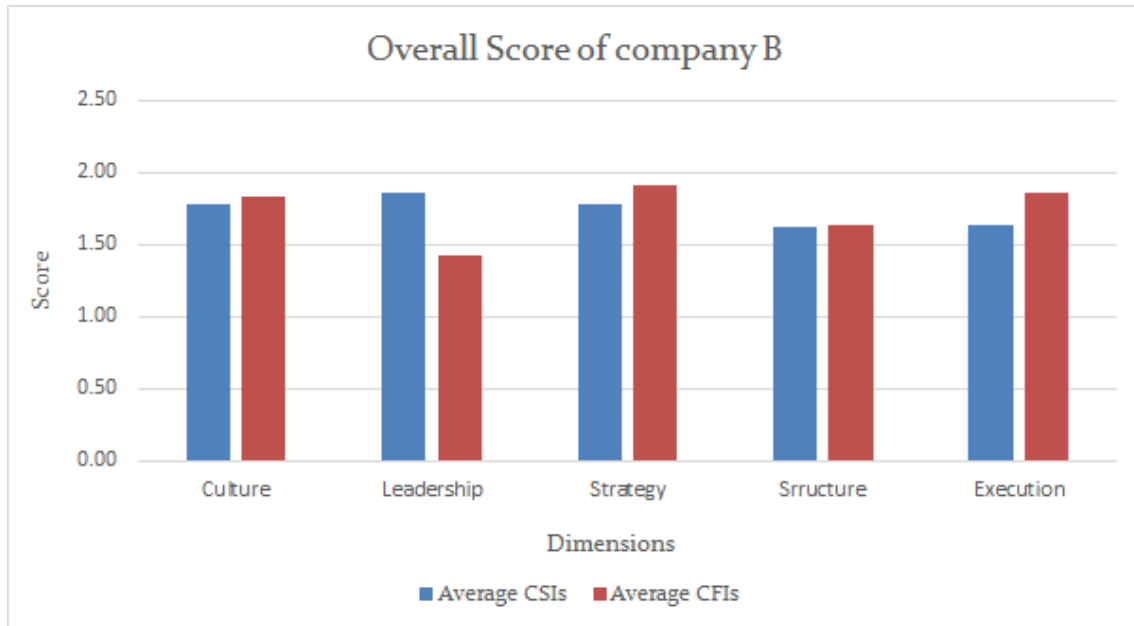


Figure 21. Average score of company B on the five dimensions

The Figure above shows the intensity of CSIs (average score) and CFIs (average score) for all five dimensions: culture, leadership, strategy, structure and execution. The average value of CSIs on the culture dimension suggests that the company is doing good on this dimension as it has scored 1.79. However, the average value of 1.83 for CFIs which is higher than CSIs score suggests that the company is moving in the direction that might be fatalistic when considering organizational innovation such as sole focus on competition, people don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results, diverse inputs or conflicting opinions not honoured etcetera (see appendix 13 for more CFIs). Similarly, the leadership score of 1.86 and 1.43 on CSIs and CFIs side informs that the company has a good hold on leadership dimension but it does require attention on the CFI's side as many indicators suggest that the company is swinging between CSI and CFI (see appendix 14 for more details). Although the company has scored almost the same score as leadership on the CSIs side of strategy, the increasing score of CFIs's side in the strategy dimension requires more attention. The company has scored almost equal score on structure dimension with an above average score on CSI side as well as on the CFI. An above average score on the CSI is a sign that the

company is progressing towards higher innovativeness level, however, an above average score on CFI suggests that the company is lagging or not paying enough attention to this side which might weaken the overall innovativeness of the company. Similarly, an above average score on CSI's side of execution is a good indication for the company, however, the company has scored higher on CFIs' side which outlines that there are issues in the execution dimension that require immediate attention to foster innovativeness (See Appendix 17 for details).

Let's plot the scores of company B in the matrix depicted below to analyse how the company is spread in matrix grid and to see where the company is now.

Table 21. Plotting company B on the matrix.

CSI's score		CFI's score		
		1	2	3
		Mild	Moderate	Strong
1	Mild			
2	Moderate	Leadership	Culture; Strategy ; Structure; Execution	
3	Strong			





The matrix above depicts the very same analysis as company A except that the culture is moved to moderate grid and leadership is moved to moderate grid as well. The same deduction is applied to company B. In other words, the company is advised to take corrective continuous improvement steps in strategy, structure and execution dimensions that will help the company to improve its innovativeness. In addition to that, company B should also pay attention to culture dimension as culture either makes or breaks the innovative nature of an organization (Holman,

Jaruzelski & Loehr, 2011; Bodell, 2013; Couros, 2015; Boston & Zhao, 2017; Berry, 2018; Kirsner, 2018). Furthermore, company B should also aim to uplift its leadership score so that the company will be better equipped for success as leadership plays a subtle but major role in enhancing organizational innovativeness (Maxwell, 2007; Christensen et al., 2011; Bodell, 2013; David & Epstein, 2014; Dayer & Furr 2014; Llopis, 2014; Couros, 2015; Boston & Zhao, 2017; Price & Toye, 2017; Kirsner, 2018).

4.2.3.3 Suggestions for companies

Companies should devise a plan in a way that helps the company to strengthen its CSIs' side on culture, leadership, strategy, structure and execution dimensions as well as reduces the impact of CFIs on all five dimensions.

Table 22. Plan to improve organizational innovativeness.

CSI's score		CFI's score		
		1	2	3
		Mild	Moderate	Strong
1	Mild			
2	Moderate			
3	Strong			

As depicted in the table above, the company should aim to move in the left corner which will provide ultimate leverage to the company not only in terms of innovativeness but also market share, sustainability and earning handsome profit. Every business has a core operating principle, that is, some companies are good at leadership while some are good at creating excellent culture where business thrives (Keller, & Price, 2011). The survey says that the company A and B are good at leadership in comparison to other dimensions. Although it is up to companies to needs to identify out of 5 dimensions which dimension is easy to cultivate for the company with the help of internal discussion. Once the dimension is identified, the company's goal is to move that dimension to the left corner as shown above in the table. The benefit of this pursuit is that it creates butterfly effect that will strengthen other dimensions as well and thus the overall innovativeness of the company.

Similarly, companies shall continuously diagnose its innovativeness preferably twice a year in the interval of six months so that the company can evaluate how the previous plan has improved the chosen dimension and on which dimension the company will focus next.

4.2.4 Discussions with companies

I presented the detailed report to both companies to discuss the relevance and credibility of the diagnosis.

The company A was happy with the overall results as they are doing good and products and services that they have are quite innovative. The CEO and CTO of company A argued that the results that they received are quite contrary to what they used to hear from other consultants and even from employees, especially what they are doing that is not adding any value in terms of innovativeness. They added that some of the CFIs that have scored relatively high are worth exploring with open mindedness (see appendix 1 to 5 for more details). They further added that they

should capitalize on CSIs that have scored high as these CSIs are easy to implement and track the progress (see appendix 1 to 5 for more details).

The company B was content with the result that they got. Managers of the company B argued that that the diagnosis is comprehensive and eye opening as being a new establishment they can see what they are doing right and what they are doing that are not adding any value in terms of organizational innovativeness. They were especially intrigued to see results about CFIs. They outlined that they had not considered such indicators before and these indicators are certainly helpful in staying on course and enhance innovativeness. The manager of the firm added that how can they track the progress on the both sides (CSI and CFI)? The answer to this question was that the author of this research will develop a digital platform where they can self-evaluate their progress and devise a plan to improve organizational innovativeness.

4.3 Discussion and result

As we have noticed from the analysis section, most organizations or people in organizations tend to focus only on CSIs that give only half of the picture. As discussed in section 3.1, concepts of CSI and CFI, even organizations heading toward failure do not notice this because they are intensely focused on CSIs and ways to achieve or recognize so defined CSIs. McGrath (2019) outlined in her book 'see around the corner' that businesses that fail to acknowledge that something else than what they are trying to achieve is emerging or happening invariably fails. Researchers (Ignatius, 2013; Hoven, 2014) argued that the market is constantly in flux, meaning it keeps evolving and fluctuating and thus organizations that are operating in the current market, do not necessarily occupy the same market as before because customers might have moved on leaving an organization with ghost customers that an organization finds hard to believe. This where organizations fall into sunk cost fallacy (Bennett, 2012; Ducharme, 2018). In other words, customers

that were customers, are not customers anymore; products or services that were successful, are not compatible to customers' needs anymore and yet an organization resists giving up on previously held business philosophy and/or business logic. So, he suggested performing strategy evaluation often to figure out changes that might be taking place. Therefore, having CFIs in a framework already will inform organizations that the market is shifting in the new direction and thus necessary precautions and actions must be taken.

De Wit (2017) postulated that organizations should keep eyes on how the market and surrounding are changing and evolving. He further outlined that organizations must have a leader and executive teams who will notice these changes and create changes in strategy, structure and execution process. Price & Toyre (2017) adds that the dynamic nature of the environment where business operates demands organizations to have a leader who can foresee the changes that might happen and connects the dots rapidly without losing the sight. And as Mcgrath (2019) puts it, failing to notice such changes will result in failure as well as business might be eradicated from the marketplace. Thus, incorporating CFIs together with CSIs is a way forward to enhance organizational innovativeness as such measurement will allow organizations to notice such changes while pursuing their innovation goals.

Similarly, Horowitz (2019) posits that what a company is, what it does, and what it wants to be are the core to build a company's culture. And thus, to be innovative organizations need to methodically engineer the culture in a way that makes it innovative (Horowitz, 2019). Such methodical engineering requires organizations to be aware of cultural norms that are helping them and norms that are hurting them. Because knowledge of one on the expense of another might lead organizations to a place where the marketplace is absolute and customers are imaginary. Therefore, an incorporation of CFI in conjunction with CSI will help businesses become aware of norms that are hurting and helping them and thus help organizations in engineering a culture that is innovative.

4.4 A diagnostic tool

A thorough literature review and empirical study that implemented three different research strategies have resulted in a self-evaluating diagnostic tool as presented in the figure below that an organization can deploy inside the organization in conjunction with their existing processes and tools to facilitate organizational innovativeness.

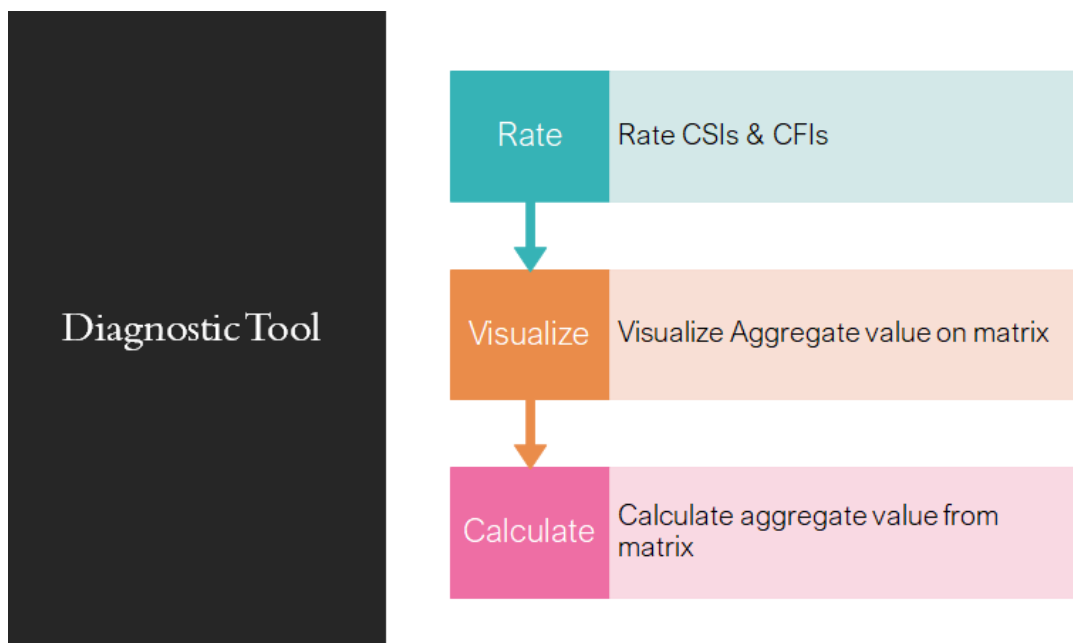


Figure. Configuration of the diagnostic tool

As outlined above, this tool consists of three steps: rate, visualize and calculate. In the first step, an organization receives a survey link where they can rate the organization on five dimensions. Each dimension consists of a set of 12 CSI and CFI except strategy that has a set of 14 CSI and CFI (see theoretical framework section and appendix 19). It is encouraged to evaluate the organization honestly and increase participation as the involvement of more employees results in better evaluation and thus better diagnosis.

The second step is about visualizing the data gathered through self-evaluation. This tool visualizes the aggregate value of each dimension on a matrix developed by the author (see appendix 18).

The third and the final step of this tool is to diagnose the overall organizational innovativeness for an organization. This overall value is deduced by aggregating the value of all five dimensions from the matrix with the help of excel tool. The author of this research takes the responsibility for this part.

4.5 Reliability and validity of the research process

This section presents justification on the reliability of the data and validity of the entire research in addition to a diagnostic tool. In order to demonstrate the validity of the research, I will explore content validity and utility validity, in addition to, internal and external validity of the research.

The *content validity* was established with the help of focus group study. The author sent the summary of the research to all participants including a framework for a diagnostic tool. During the focus group discussion, my goal was to observe and document their opinions, reasoning and thoughts on the research questions, objectives, methodology and framework. I revised the framework and questionnaire designed for a survey based on the focus group discussion.

The goal with *internal validity* is to check whether the research findings are compatible with the reality and the researcher has observed and measured what was supposed to be measured (). In order to boost the internal validity of this research, data was collected via literature review, focus group study, semi-structured interview and survey. This triangulation has provided ample information and evidence to reduce biases and corroborate findings. Furthermore, the result of each step such as focus group study, semi-structured interview and survey was sent

to participants so the result could be confirmed and validated. Similarly, I was following ethical rules and principles to reduce biases and analyse and interpret results truthfully and honestly.

The *utility validity* of this research was confirmed with the help of discussion with two companies. One of the aims of this discussion was to perform a 'weak market test' to check the construct validity of the tool (Kasanen, 1986). The author asked both companies whether they are willing to adopt this tool to measure their innovativeness frequently and the both companies were affirmative in their responses. Company A went a step further and asked the author to perform this diagnosis process on behalf of the company. The positive answers from companies C-level and management team along with various discussions among focus groups and interviews confirms the high willingness to deploy a tool developed in this research which also fulfills the requisite for a '*weak market test*'. In addition to that, a diagnostic tool developed in this research is rather simple and intuitive to use compared to existing tools and techniques available in the literature and the marketplace. Therefore, the developed tool can be implemented with the confidence as the implementation has been tested and documented for two companies already. Burns (1999, p. 160) defines external validity as "*how generalisable to the other contexts or subjects is our research.*" External validity is about applicability of final outcomes in other areas of science and/or subject (Zohrabi, 2013). The building blocks of this tool have combined knowledge and existing literature from the various fields such as creativity, leadership, strategy, structure, execution, paradox, economics and other areas of such. These theoretical linkage points to scientific validity and generalizability of this research. Hence, it could be argued that the framework would be applicable in other industries and this practical applicability and usability have been demonstrated throughout the research.

Reliability is one of the major components of any research process. This is concerned with "*...the consistency, dependability and replicability of the results obtained from a piece of research*" (Nunan, 1999, Zohrabi, 2013). Zohrabi (2013) outlines three

methods to ensure dependability of a research: investigator's position, triangulation and trail audit. Investigator's position is concerned with documenting and explaining explicitly the different phases and processes of the research which it has done well as per university of Vaasa guidelines in close cooperation with a supervisor. This research is divided into 5 main chapters: introduction, background of the technology industry, literature review, empirical study and conclusion. Every chapter is designed with a purpose and scope in mind that contributes to developing a diagnostic tool which is the outcome of this research (see table of contents for more details). Similarly, to further increase the dependability of this research, data was collected in many forms such as literature review, focus group study, semi-structured interview and survey (see empirical section for more details). In addition to that, every medium of data collection is well documented in this research to facilitate replication (see empirical section 4.1, 4.2 and 4.3).

Internal reliability relates to "*...consistency of collecting, analyzing and interpreting the data*" (Zohrabi, 2013). Burns (1999, p. 21) outlines that "*Would the same results be obtained by other researchers using the same analysis?*" In order to guard against internal threats, this research collected findings from other researchers and utilized them to create the building blocks of a diagnostic tool (see literature review for more details). Similarly, data collection during focus group study and semi-structured interviews were recorded digitally to preserve the data as well as to re-study and reanalyse them. In addition to that, a fellow colleague who is PhD candidate and pioneer researcher in business paradox from the same university was chosen (see appendix 1, last candidate) from the beginning to help in facilitating research design, questionnaire design and data collection technique. Furthermore, during data analysis and interpretation, another fellow university colleague was asked to join the process (3rd candidate in appendix 1). With the help of these two fellow researchers, an appropriate data analysis tool was selected and a conclusion was drawn. The conclusion of this research was sent to these two researchers before sending it to the supervisor of this study so that inferences could be analysed, interpreted and validated from the different perspectives. However, low inference

descriptors such as motivation and interest to participate in the survey was hard to observe and document as the survey was implemented with the help of the management team in both companies where I was not available due to COVID-19.

External reliability deals with the replication of the research. According to Burns (1999, p. 21-20), "*Could an independent researcher reproduce the study and obtain results similar to the original study?*" This study has documented everything from the very beginning to the end. As an investigator, my role during the study was neutral. The main focus of my role was to observe, collect and document data and results with no biases and/or inclinations. The literature used in this study is presented with a list of references that is easily accessible and verifiable. In addition to that, the participants chosen for this research are also well documented (see appendices) and the empirical section also outlines why they were chosen for this study. Moreover, this research collected qualitative data through literature review, focus group study, and semi-structured interviews as well as quantitative data via survey. In order to reduce vagueness and get clarity, dependent and independent variables were outlined and defined before and during data analysis.

5 Conclusion

This chapter outlines the summary of research goals and objectives followed by its findings and contribution to the organizational innovativeness research. Furthermore, this research outlines some issues for future research and investigation.

5.1 Research goals and objectives

This study began by expounding the importance of innovation, which is the result of being innovative, in the context of organizational settings. It further elaborated how innovation is studied in organizational settings and the impacts of such studies on organizational innovativeness. This led to identification of inconsistency among organizational innovativeness constructs which resulted in realization of a research gap, that is, organizational innovativeness construct focused solely on critical success indicators and therefore missed an important aspect of organizational innovativeness, namely, critical failure indicators. Hence, this research focused on developing a diagnostic tool that will help organizations measure their innovativeness comprehensively. The research proposed two research questions (*What is the current state of innovativeness measurement in technology companies? And How can a diagnostic tool help to ensure growth and success for technology companies?*) in addition to three research objectives as outlined below to resolve the identified issues and achieve the goal of this reach:

- A. Identify and present a set of critical success indicators (CSIs) and critical failure indicators (CFIs) for technology companies to be innovative.
- B. Determine how innovative technology companies position themselves to ensure growth and success in the marketplace.

- C. Develop a tool that can be adopted by technology companies to measure their innovativeness successfully.

The study preceded with defining the keywords for the research as well as limitations. Chapter 2 presented an overview of the technology industry. This chapter focused mainly on the industry's growth and evolution and outlined why the need for organizations to be innovative now is more essential than ever.

Chapter 3 started with outlining the different perspectives on organizational innovativeness and how these different perspectives have created fuzziness in developing a measurement construct. Hence, this study defined organizational innovativeness as a latent capability of an organization that can be measured, influenced, and improved. This chapter introduced the concept of critical success indicator (CSI) and critical failure indicator (CFI). The chapter further identified 5 dimensions of organizational innovativeness (culture, leadership, strategy, structure and execution) where CSIs and CFIs were discovered and synthesized for each dimension.

Chapter 4 described the empirical part of this research and its results. The research adopted a mixed method approach to answer the questions established in the introduction section. This chapter further outlined strategies used for data collection such as focus group study, semi-structured interviews and survey. This section helped in strengthening the building blocks built in chapter 3 for a diagnostic tool. This chapter further touched on reliability and validity of this research and how this research could be replicated in other industries with minor modifications.

5.2 Findings and contributions

This research discovered that there is inconsistency among organizational innovativeness measurement instruments. Furthermore, the tools that are available

to organizations to measure their innovativeness relies solely on critical success indicators (CSI). This led to developing a new concept called critical failure indicators (CFI) which is defined as indicators that must not be performed to achieve desired outcomes (e.g. innovativeness). In other words, CFIs inform organizations that they are leading towards undesired outcomes. Similarly, this study identified 5 dimensions of organizational innovativeness and developed a comprehensive framework for diagnosing organizational innovativeness with the help of these dimensions and their relative set of CSIs and CFIs.

The major contribution of this research in the field of organizational innovativeness is that it developed a diagnostic tool that would allow organizations to measure their organizational innovativeness comprehensively. This tool allows organizations to self-diagnose their innovativeness and gain insights into what they are doing right, what they are not doing right and how they can continuously improve their innovativeness.

5.3 Suggestions for future research

This study identified 5 dimensions of organizational innovativeness with their relative set of CSIs and CFIs and developed a self-assessment diagnostic tool for businesses in the technology industry. The applicability and usability of this tool requires more data collection from this and other industries. Therefore, one major stream of future research is to roll this tool industry and cross-industry wise and check its reliability and validity in those contexts. Moreover, another possible research area is to expand the list of CSI and CFI in the context of the technology industry as well as other industries. In addition to that, the expansion of organizational innovativeness dimensions is another plausible research field.

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Appendices

Appendix 1. List of focus group study participants

Mohammed Nadir	
Knowledge & Experience	<p>Mathematical modelling of Optoelectronic Devices such as Multiple Quantum Well Lasers including Distributed Feedback Lasers and Confined Cavity Quantum Electrodynamics (CCQED). Recently, I have been involved in optimizing 'Direct Green Lasers' by mathematical modelling and it could be used in state-of-the-art devices such as pico-projector, laser TV and more upcoming novel devices.</p>
Profession	<p>Life Member IEEE; Researcher at Tampere University, Faculty of Engineering and Natural Sciences Tampere, Finland.</p>

Ahmed Shalaby	
Knowledge & experience	Efficiency Agent, Welfare State Digitalisation, Ecosystems, Digital Transformation, Innovation Psychology.
Profession	CEO, Bonanza Oy.

Alassani Fousseni Igodo	
Knowledge & experience	Master's in Industrial System analytics, Support specialists at wärtsilä.
Profession	System Engineer at Valmet Oy/Automation.

Mechiche Macipsa Mourad	
Knowledge & experience	Research in business paradox (PhD Candidate), Master's in Industrial management.
Profession	CEO at ILA MS

Appendix 2. List of contacted persons that were not able to participate in the focus group study

Names	Profession	Employer
Olga Duk	Innovation Consultant, M.Sc. (Econ.)	Spinverse
Jesse Nieminen	Co-founder, Growth	Viima Solutions Oy
Joona Tykkyläinen	Co-founder, Engineering	Viima Solutions Oy
Sari Kola	Senior Consultant, Strategy & Innovation Management, D.Sc. (Tech.)	Spinverse
Antero Vesterinen	Consultant, M.Sc. (Econ.)	Spinverse
Ville Tuomi	University Lecturer, School of Technology and Innovations, Production	University of Vaasa
Erika Forstén	Consultant, M.Sc. (Tech.)	Spinverse

Dr Helena Forsman	Innovation Management and Small Business Development; Project Management	Senior Research Fellow - Member of the Board
Lauri Kaipainen	Innovation Consultant, M.Sc. (Econ.)	Spinverse

Appendix 3. Checklist

1. List of people to be contacted.
2. Cover letter for the invitation.
3. List of questions.
4. Ask their permission during the interview for recording the interview, publishing their name, position and company.
5. Inform them how the result will be published.
6. Send participants' reports.

Appendix 4. List of people to be contacted

Name	Position	Company
Stefan Lindegaard	Consultant and coach for leadership, corporate innovation and talent management	UPGRADE!
Chris Rodgers	Consultant, speaker and writer on organizational dynamics and enabling change. Author of Informal Coalitions.	Chris Rodgers Consulting Ltd
Aman Yadav	Senior Software Developer	Anders
Tero Koskela	CTO	eSend Finland Oy
Sameer Aryal	Supplier Development	Wärtsilä Oy
Tero J. Majuri	CEO & Sales Director	eSend Finland Oy

Bart Bremmer	Innovation sociologist	farmup_NL
Mechiche M. Mourad	CEO	ILA MS Oy

Appendix 5. List of participants for In-depth interview.

Name	Position	Company	Medium for interview
Mechiche M. Mourad	CEO	ILA MS Oy	In-person
Aman Yadav	Senior Software Developer	Anders	Zoom
Tero Koskela	CTO	eSend Finland Oy	In-person
Tero J. Majuri	CEO & Sales Director	eSend Finland Oy	In-person
Bart Bremmer	Innovation sociologist	farmup_NL	Zoom

Appendix 6. Cover letter.

Dear receiver,

I'm writing to ask you for your involvement in an important study that is designed to understand the mechanism behind organizational innovativeness of technology companies and how technology companies measure their innovativeness. Until now, organizations have focused solely on critical success indicators (CSIs) when measuring organizational innovativeness. This research, on the other hand, introduces critical failure indicators (CFIs) as a new indicator type and combines both types of indicators (CSI and CFI) into a single framework when measuring organizational innovativeness. This research aims to collect data in a professional and unbiased manner that would contribute to deducing a meaningful and realistic

conclusion. The findings of this research will be available to your organization and any other entities that aim to study organizational innovativeness.

The purpose of this research is to develop a comprehensive diagnostic tool that would help organizations like yours to measure their organizational innovativeness in its true sense and thus reveal the areas that need improvements and capitalize on strengths to enhance organizational innovativeness. The following questionnaire is developed to measure your perception on organizational innovativeness and how you assess your organization's innovativeness.

This is going to be a semi-structured interview which will take no more than 75 minutes. This research will keep the discussion in complete confidence and will only publish summarized results in the form of graphs and figures. The findings and a tool will be sent to you after the completion of this research.

I would like to thank you for the time you have given to complete this survey. Looking forward to receiving your response soon.

Best Regards,
Surya Yadav

Appendix 7. List of questions.

1. How do you innovate? What does innovation look like in your company? (Kocher, 2013; Kylliäinen, 2019)
2. How does your innovation stack up against your main competitors and within your industry? (Kocher, 2013; Kylliäinen, 2019)
3. What is your experience with tools that measure organizational innovativeness?
4. Do you think organizational innovativeness can be measured?
5. How would you diagnose innovativeness in an organization?
6. Do you think diagnosing an organization to assess innovativeness by combining two different perspectives in a single framework would add value?

Appendix 8. Score of company A on culture dimension

	1	2	3	Average
An organization looks for ways to make its own business obsolete.	66.67%	0%	33.33%	1.67
An organization competes in the market to be better than competitors.	11.11%	22.22%	66.67%	2.56
An organisation continually discards things done previously.	44.45%	44.44%	11.11%	1.67
People don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results.	33.33%	44.45%	22.22%	1.89
Anyone can bring up problems and tough issues in a formal or informal way.	22.22%	11.11%	66.67%	2.44
Diverse inputs or conflicting opinions not honoured.	77.78%	0%	22.22%	1.44
It is safe to take smart risks.	11.11%	66.67%	22.22%	2.11
If I make a mistake on our team, it is held against me.	88.89%	0%	11.11%	1.22
Failure is investigated thoroughly for learning.	22.22%	55.56%	22.22%	2
Failure is used to kill the project.	77.78%	22.22%	0%	1.22
An organization focus on proper challenge or opportunities by delegating resources, freedom, support to people.	11.11%	33.33%	55.56%	2.44
Resources, support, and encouragement are delegated to day to day routine work that keeps people busy.	22.22%	44.45%	33.33%	2.11

Appendix 9. Score of company A on leadership dimension

	1	2	3	Average
A leader creates a compelling vision and provides reasons to innovate.	0%	37.5%	62.5%	2.63
A leader is chosen based on experience and lacks aspiration to innovate.	100%	0%	0%	1
A leader is known for combining unconventional ideas and sources together.	0%	75%	25%	2.25
A leader is not able to connect emerging events and trends.	87.5%	12.5%	0%	1.13
A leader is comfortable with ambiguity and adept at finding winning solutions.	12.5%	37.5%	50%	2.38
A leader lacks the ability to act on signals crucial to the future of the business.	87.5%	12.5%	0%	1.13
A leader connects beyond hierarchy and leads in a fluid, consultative manner.	12.5%	25%	62.5%	2.5
A leader is known for authority and hierarchy.	75%	0%	25%	1.5
A leader Inspires people to explore and experiment.	0%	12.5%	87.5%	2.88
A Leader fears success.	87.5%	12.5%	0%	1.13
A leader matches resources availability to opportunities.	0%	37.5%	62.5%	2.63
Resources are reserved a leader.	50%	50%	0%	1.5

Appendix 10. Score of company A on strategy dimension

	1	2	3	Average
A strategy is taken as a journey that is revised and updated frequently.	11.11%	33.33%	55.56%	2.44
A strategy is done once a year.	66.67%	22.22%	11.11%	1.44
Creating new market opportunities.	11.11%	22.22%	66.67%	2.56
Competing in the same market.	22.22%	55.56%	22.22%	2
Setting boundaries that define fields to explore.	11.11%	66.67%	22.22%	2.11
Lack of strategic alignment with an existing business.	66.67%	22.22%	11.11%	1.44
Resources move freely throughout an organization.	11.11%	44.45%	44.44%	2.33
Resources are reserved for chosen ideas.	33.33%	66.67%	0%	1.67
Strategies are formulated based on inputs from both the bottom and top levels.	22.22%	66.67%	11.11%	1.89
Executive teams formulate strategies based on financial data.	22.22%	44.45%	33.33%	2.11
Value innovation is part of the innovation portfolio.	11.11%	55.56%	33.33%	2.22
Organizations put an overemphasis on cost-cutting and incremental innovation.	66.67%	22.22%	11.11%	1.44
Developing capability for the future.	11.11%	33.33%	55.56%	2.44
Organizations focus on creating processes and procedures to enhance efficiency.	11.11%	66.67%	22.22%	2.11

Appendix 11. Score of company A on structure dimension

	1	2	3	Average
A manageable dedicated team is formed to take innovation to the market.	11.11%	44.45%	44.44%	2.33
Innovation is part of a performance engine team.	11.11%	44.45%	44.44%	2.33
Team designs a process to bring innovation to market.	0%	55.56%	44.44%	2.44
An organization relies on the previous process to bring innovation to market.	44.44%	55.56%	0%	1.56
Collaboration and cooperation are facilitated among innovation team and performance engine.	22.22%	22.22%	55.56%	2.33
Innovation team is completely isolated from the performance engine due to conflicts in interests.	88.89%	0%	11.11%	1.22
A scientific approach to decision making.	33.33%	22.22%	44.45%	2.11
The decision-making process is fuzzy and relies on sound argument.	22.22%	66.67%	11.11%	1.89
Accountability and responsibility are outlined clearly.	22.22%	55.56%	22.22%	2
Accountability and responsibility are overlapping between the innovation team and performance engine.	44.45%	33.33%	22.22%	1.78
Maintaining innovativeness passion through a performance management system.	11.11%	44.45%	44.44%	2.33
Lack of clearly defined innovation metrics.	77.78%	11.11%	11.11%	1.33

Appendix 12. Score of company A on execution dimension

	1	2	3	Average
The role of innovation is clearly defined inside the organization.	0%	77.78%	22.22%	2.22
Clear definition of what innovation really means to an organization is not articulated.	22.22%	33.33%	44.45%	2.22
Experimentation is designed with a vision in mind.	11.11%	55.56%	33.33%	2.22
A weak or no experimental design and thus killing ideas too soon.	88.89%	0%	11.11%	1.22
Predictions are measured with the help of well-defined innovation metrics.	22.22%	44.45%	33.33%	2.11
Predictions are measured against performance engine metrics.	22.22%	55.56%	22.22%	2
Idea adoption and execution time are short.	11.11%	66.67%	22.22%	2.11
Rigorous time-consuming idea adoption and execution process.	33.33%	55.56%	11.11%	1.78
Lesson learned is documented and new knowledge is shared inside the organization.	0%	55.56%	44.44%	2.44
No scientific approach to knowledge creation.	66.67%	11.11%	22.22%	1.56
Assimilate innovation into the core business.	11.11%	22.22%	66.67%	2.56
Innovation is treated as a separate entity.	55.56%	11.11%	33.33%	1.78

Appendix 13. Score of company B on culture dimension

	1	2	3	Average
An organization looks for ways to make its own business obsolete.	71.43%	28.57%	0%	1.29
An organization competes in the market to be better than competitors.	14.28%	14.29%	71.43%	2.57
An organisation continually discards things done previously.	28.57%	57.14%	14.29%	1.86
People don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results.	0%	100%	0%	2
Anyone can bring up problems and tough issues in a formal or informal way.	14.29%	57.14%	28.57%	2.14
Diverse inputs or conflicting opinions not honoured.	14.29%	57.14%	28.57%	2.14
It is safe to take smart risks.	14.28%	71.43%	14.29%	2
If I make a mistake on our team, it is held against me.	85.71%	0%	14.29%	1.29
Failure is investigated thoroughly for learning.	14.29%	85.71%	0%	1.86
Failure is used to kill the project.	71.43%	14.28%	14.29%	1.43
An organization focus on proper challenge or opportunities by delegating resources, freedom, support to people.	57.14%	28.57%	14.29%	1.57
Resources, support, and encouragement are delegated to day to day routine work that keeps people busy.	57.14%	28.57%	14.29%	1.57

Appendix 14. Score of company B on leadership dimension

	1	2	3	Average
A leader creates a compelling vision and provides reasons to innovate.	14.28%	71.43%	14.29%	2
A leader is chosen based on experience and lacks aspiration to innovate.	71.43%	14.28%	14.29%	1.43
A leader is known for combining unconventional ideas and sources together.	28.57%	71.43%	0%	1.71
A leader is not able to connect emerging events and trends.	71.43%	28.57%	0%	1.29
A leader is comfortable with ambiguity and adept at finding winning solutions.	14.28%	71.43%	14.29%	2
A leader lacks the ability to act on signals crucial to the future of the business.	42.86%	42.86%	14.28%	1.71
A leader connects beyond hierarchy and leads in a fluid, consultative manner.	42.86%	57.14%	0%	1.57
A leader is known for authority and hierarchy.	71.43%	14.28%	14.29%	1.43
A leader Inspires people to explore and experiment.	14.29%	57.14%	28.57%	2.14
A Leader fears success.	85.71%	0%	14.29%	1.29
A leader matches resources availability to opportunities.	28.57%	71.43%	0%	1.71
Resources are reserved a leader.	57.14%	42.86%	0%	1.43

Appendix 15. Score of company B on strategy dimension

	1	2	3	Average
A strategy is taken as a journey that is revised and updated frequently.	28.57%	57.14%	14.29%	1.86
A strategy is done once a year.	85.71%	14.29%	0%	1.14
Creating new market opportunities.	14.28%	42.86%	42.86%	2.29
Competing in the same market.	0%	57.14%	42.86%	2.43
Setting boundaries that define fields to explore.	28.57%	71.43%	0%	1.71
Lack of strategic alignment with an existing business.	28.57%	57.14%	14.29%	1.86
Resources move freely throughout an organization.	57.14%	42.86%	0%	1.43
Resources are reserved for chosen ideas.	28.57%	42.86%	28.57%	2
Strategies are formulated based on inputs from both the bottom and top levels.	28.57%	57.14%	14.29%	1.86
Executive teams formulate strategies based on financial data.	14.29%	85.71%	0%	1.86
Value innovation is part of the innovation portfolio.	57.14%	28.57%	14.29%	1.57
Organizations put an overemphasis on cost-cutting and incremental innovation.	14.29%	57.14%	28.57%	2.14
Developing capability for the future.	28.57%	71.43%	0%	1.71
Organizations focus on creating processes and procedures to enhance efficiency.	28.57%	42.86%	28.57%	2

Appendix 16. Score of company B on structure dimension

	1	2	3	Average
A manageable dedicated team is formed to take innovation to the market.	28.57%	57.14%	14.29%	1.86
Innovation is part of a performance engine team.	42.86%	57.14%	0%	1.57
Team designs a process to bring innovation to market.	57.14%	42.86%	0%	1.43
An organization relies on the previous process to bring innovation to market.	42.86%	57.14%	0%	1.57
Collaboration and cooperation are facilitated among innovation team and performance engine.	28.57%	71.43%	0%	1.71
Innovation team is completely isolated from the performance engine due to conflicts in interests.	57.14%	42.86%	0%	1.43
A scientific approach to decision making.	57.14%	28.57%	14.29%	1.57
The decision-making process is fuzzy and relies on sound argument.	28.57%	57.14%	14.29%	1.86
Accountability and responsibility are outlined clearly.	71.43%	14.28%	14.29%	1.43
Accountability and responsibility are overlapping between the innovation team and performance engine.	28.57%	57.14%	14.29%	1.86
Maintaining innovativeness passion through a performance management system.	28.57%	71.43%	0%	1.71
Lack of clearly defined innovation metrics.	42.86%	57.14%	0%	1.57

Appendix 17. Score of company B on execution dimension

	1	2	3	Average
The role of innovation is clearly defined inside the organization.	42.86%	42.86%	14.28%	1.71
Clear definition of what innovation really means to an organization is not articulated.	0%	71.43%	28.57%	2.29
Experimentation is designed with a vision in mind.	28.57%	71.43%	0%	1.71
A weak or no experimental design and thus killing ideas too soon.	14.28%	71.43%	14.29%	2
Predictions are measured with the help of well-defined innovation metrics.	57.14%	42.86%	0%	1.43
Predictions are measured against performance engine metrics.	42.86%	57.14%	0%	1.57
Idea adoption and execution time are short.	57.14%	0%	42.86%	1.86
Rigorous time-consuming idea adoption and execution process.	14.29%	85.71%	0%	1.86
Lesson learned is documented and new knowledge is shared inside the organization.	71.43%	28.57%	0%	1.29
No scientific approach to knowledge creation.	28.57%	71.43%	0%	1.71
Assimilate innovation into the core business.	14.29%	85.71%	0%	1.86
Innovation is treated as a separate entity.	42.86%	42.86%	14.28%	1.71

Appendix 18. CSI and CFI matrix

CSI's score		CFI's score		
		1	2	3
		Mild	Moderate	Strong
1	Mild	(1,1)	(1,2)	(1,3)
2	Moderate	(2,1)	(2,2)	(2,3)
3	Strong	(3,1)	(3,2)	(3,3)

Appendix 19. Survey questionnaire

Diagnosing Organizational Innovativeness

Survey Guidelines

Please check the table below before proceeding to the survey. This gives you an idea of how the scale is defined and what you should consider when rating each statement. Please rate each indicator based on what is the current situation of your organization but not what you would like it to be. Furthermore, please rate all the statement.

Scale	Value
3	Indicator is strongly present
2	Indicator is moderately present
1	Indicator is mildly present

1. Please mention your organization's name**2. Please select your role in your organization**

- CEO or C-level Executives
- Manager
- Team Lead
- Employee

3. Rate the following statements related to your organization's culture.

	1	2	3
An organization looks for ways to make its own business obsolete.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An organization competes in the market to be better than competitors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An organisation continually discards things done previously.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People don't tend to abandon current beliefs and methods as long as they seem to produce reasonable results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anyone can bring up problems and tough issues in a formal or informal way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diverse inputs or conflicting opinions not honoured.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is safe to take smart risks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I make a mistake on our team, it is held against me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Failure is investigated thoroughly for learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Failure is used to kill the project.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An organization focus on proper challenge or opportunities by delegating resources, freedom, support to people.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources, support, and encouragement are delegated to day to day routine work that keeps people busy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Rate the following statements related to leadership in your organization

	1	2	3
A leader creates a compelling vision and provides reasons to innovate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader is chosen based on experience and lacks aspiration to innovate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader is known for combining unconventional ideas and sources together.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader is not able to connect emerging events and trends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader is comfortable with ambiguity and adept at finding winning solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader lacks the ability to act on signals crucial to the future of the business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader connects beyond hierarchy and leads in a fluid, consultative manner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader is known for authority and hierarchy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader Inspires people to explore and experiment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A Leader fears success.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A leader matches resources availability to opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources are reserved a leader.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Rate the following statements related to your organization's strategy

	1	2	3
A strategy is taken as a journey that is revised and updated frequently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A strategy is done once a year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creating new market opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Competing in the same market.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Setting boundaries that define fields to explore.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of strategic alignment with an existing business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources move freely throughout an organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resources are reserved for chosen ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strategies are formulated based on inputs from both the bottom and top levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Executive teams formulate strategies based on financial data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Value innovation is part of the innovation portfolio.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizations put an overemphasis on cost-cutting and incremental innovation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing capability for the future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organizations focus on creating processes and procedures to enhance efficiency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Rate the following statements related to your organization's structure

	1	2	3
A manageable dedicated team is formed to take innovation to the market.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Innovation is part of a performance engine team.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team designs a process to bring innovation to market.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
An organization relies on the previous process to bring innovation to market.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collaboration and cooperation are facilitated among innovation team and performance engine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Innovation team is completely isolated from the performance engine due to conflicts in interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A scientific approach to decision making.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The decision-making process is fuzzy and relies on sound argument.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accountability and responsibility are outlined clearly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accountability and responsibility are overlapping between the innovation team and performance engine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining innovativeness passion through a performance management system.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of clearly defined innovation metrics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Rate the following statements related to your organization's execution inside your organization.

	1	2	3
The role of innovation is clearly defined inside the organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clear definition of what innovation really means to an organization is not articulated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experimentation is designed with a vision in mind.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A weak or no experimental design and thus killing ideas too soon.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Predictions are measured with the help of well-defined innovation metrics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Predictions are measured against performance engine metrics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Idea adoption and execution time are short.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rigorous time-consuming idea adoption and execution process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lesson learned is documented and new knowledge is shared inside the organization.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No scientific approach to knowledge creation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assimilate innovation into the core business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Innovation is treated as a separate entity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>