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Open innovation culture and product development in a South African telecommunications operator

Prince Shonhiwa

1668082

1668082@students.wits.ac.za

A research proposal submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies

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ABSTRACT

To increase the rate of innovation during product development, telecommunications organizations are increasingly adopting open innovation strategies. Open innovation is viewed as an important business and national strategy in developing nations like South Africa to overcoming structural barriers and resource limitations.

A supportive organizational culture that encourages the bi-directional flow of knowledge inside and outside the organization is necessary for open innovation to endure.

The aim of the study is to understand how South African telecommunications companies can develop organizational cultures that support open innovation during the development of their products.

Research findings indicate that South African telecommunications providers understand the cultural attributes that are crucial for open innovation, and there is evidence of their existence to some degree. However, supportive organizational structures and capabilities must be developed to enable open innovation to mature.

KEYWORDS

Innovation, Open Innovation, Organizational Culture, Innovation Culture, Open Innovation culture, Telecommunications, Product Management, Product development

SUPPLEMENTARY INFORMATION

Project Format: Research Article

Nominated Journal: African Journal of Science, Technology, Innovation and Development

DECLARATION

I, **Prince Shonhiwa**, declare that this dissertation is my own unaided work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies at the Wits Business School in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other University.

Signature: …*P.Shonhiwa.*

On this **30th** day of **June 2023**

Name: **Prince Shonhiwa**

DEDICATION

I dedicate this research study to the African Innovation community and Innovation community in the world at large.

ACKNOWLEDGEMENTS

I wish to thank:

God for blessing me with this opportunity and giving me health and strength to endure it.

My family for always supporting and encouraging me.

My employer and my colleagues for always supporting me.

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The academic staff at the University for the invaluable knowledge imparted to us.

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I wish to honour the faith everyone has had in me, and I commit myself to use the experiences and learnings to make a positive contribution to Africa and the world.

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CHAPTER 1. INTRODUCTION

1.1 Introduction

Product development in the telecommunications sector has become increasingly complex as there is increased pressure to develop new innovative products and services that meet growing customer demands and address socio-economic challenges. The operating landscape has often been characterized as fast-changing, with the rapid developments of technologies, regulatory frameworks, and competition increasing the pressure on product development (Gupta et al., 2007; Zhu et al., 2019).

As a result, in order to survive and improve performance, there has been an increased focus on the sector to adopt open innovation models that allow organizations to extend their internal innovation capabilities and accelerate their innovation performance. This has brought about a focus on developing internal organizational cultures that can effectively embrace open models and external knowledge flows in order to respond effectively to the demanding pervasive extrinsic demands (Mortara et al., 2010; Zhu et al., 2019).

In the telecommunications sector, open innovation practices involve collaboration with various partners such as suppliers, technology integrators, academia, customers, and the public sector leads to new, or improvements in, products and services. Open Innovation culture is an organizational culture that promotes and encourages the sharing of ideas and resources with external organizations that enable effective responses to challenges (Mortara et al., 2010; Nestle et al., 2019)

In the South African context, this approach is becoming increasingly recognized as a strategy for the rapid development of new products and services. It is also a strategy that enables organizations to overcome the structural challenges faced within the ICT (Information Communication and Technology) sector, which include limited resources, poor infrastructure, as well as a skills and knowledge gap. Open Innovation is therefore not only considered as a means for creating

and exploiting new opportunities and enabling technological transfers, but also as an organizational risk management strategy (Bigliardi et al., 2012). Telecommunications organizations are, therefore, now engaged in creating organizational environments that are both enabling and sustaining for open innovation (Bigliardi et al., 2012).

1.2 Purpose of study

The research seeks to understand how South African telecommunications operators can create organizational cultures that are enabling for Open Innovation within their product development. These organizational cultures should reduce the failure of open innovation initiatives within the organizations allowing the sector to achieve its strategic goals and contribute to economic and national development.

1.3 Background of study

The operating environment of the sector

The South African telecommunications industry, which generates over R200 billion in revenue and employs over 22 000 people (ICASA, 2022), is highly competitive and rapidly evolving, with new technologies and business models constantly emerging. Like many sectors in the African continent, this evolution is barely satisfying the needs of the growing economy and its youthful population, and so there is constant pressure to increase access and reduce costs.

Despite being a sectoral leader in the Sub-Saharan region, South African telecommunications, in comparison with other nations, especially the developed economies, is still challenged in many respects with issues such as the quality of services, as well as the affordability and accessibility of services (GSMA, 2022; ITU, 2018).

The sector is under pressure to continually develop innovative products and services in order to remain competitive. However, innovation and product innovation in the sector is stifled by several challenges such as the following (DSI, 2019; ICASA, 2022; NPC, 2012):

Lack of financial resources – Over the past five years, the total Telecommunications investment in South Africa has gradually declined from R47 billion in 2017 to R33 billion in 2021. The sector receives very limited investment compared to developed nations in the Global North and yet it requires high levels of investment as it is inherently highly capital-intensive due to the high costs of communications infrastructure that must be distributed nationwide, i.e., network equipment, base stations, and Datacentres. Costs are also exacerbated by poor national infrastructure i.e. unreliable energy supply that increases the rate of equipment failure. Another significant cost driver is the persistent vandalism and infrastructure theft of batteries and cables. The South African National Infrastructure Plan estimates that it will be required to spend over R6 trillion between 2016 and 2040 to achieve its development goals as set out in the National Development Plan. The financial constraints referred to earlier limit the

ability of the sector to innovate and develop new innovative products and services (DPWI, 2022; ICASA, 2022; Negash & Patala, 2006).

Lack of Research and Development (R&D) investment - The Global Innovation Index ranks South Africa 61st out of 132 countries, citing significant constraints in the country's ability to generate innovations. Drivers in the sector include limited financial resources and the need for substantial investment in Research and Development (R&D), especially at the primary science and technology level. As a result, a limited amount of commercialized IP is generated by the sector (Anthipi & Anastassios, 2011; WIPO, 2022). This is evidenced by a large number of product designs, business models, and technologies that are modelled outside the country and either replicated or imported. Compared to Global North Countries, Africa, like many developing economies, is not devoting adequate levels of investment in telecommunications (Negash & Patala, 2006).

Lack of access to the latest technologies required to remain competitive – Financial strain and lack of investment in R&D result in South African Operators not having access to leading technologies that enable them to compete effectively and develop innovative products and services – 4G and 5G quality and penetration of South Africa is still lacking in South Africa compared to the rest of the word (ICASA, 2022).

Lack of skills – South African operators face challenges in attracting and retaining people with the skills and expertise to drive innovation. This is evidenced by the slow rate of, and failures in, executing several national development and modernization initiatives, the large-scale outage of digital services, and the persistent emigration of skills out of the country (DHET, 2019; IRMSA, 2022). These skills, which include technical and managerial skills, are required to develop innovative products and keep up to date with global innovations. The National Development 2030 Plan aims to address these challenges by increasing government spending and investment in innovation to improve outputs and skills, to increase university enrolments by 1.36 million by 2030, and producing over 30 000 artisans per year (DHET, 2019).

Legal and regulatory barriers – The sector is challenged by an unresponsive and unfavourable regulatory operating environment that is not responsive to technological developments and market demands. South Africa is ranked 45 out of 55 countries for the effectiveness of its intellectual property frameworks (USCC, 2022). Its telecommunications framework is not responsive. This includes issues such as delayed spectrum allocation and complex licensing requirements that result in barriers for new market entrants, prohibiting competition and market innovation (ICASA, 2022).

Open Innovation in the sector

A response strategy adopted by operators worldwide, including those in South Africa, is Open Innovation (De Paulo et al., 2017; Krause & Schutte, 2015; Mortara et al., 2010). Open Innovation advocates opening the organizations' internal innovation processes to external parties (Chesbrough, 2003; Kaur et al., 2014).

Operators have extended their innovation process with external inflows by embarking on initiatives such as – crowdsourcing of ideas, shared development platforms, joint research with academia, user involvement in the development process, and sharing of Intellectual Property (IP). In order to develop an innovation culture, operators have taken actions such as establishing dedicated innovation functions, developing policies for collaborating with external parties, and incentivizing collaboration with external parties. Through collaboration with external, the aim is to increase the quantity of innovative ideas, lower research, and development costs, and enter new markets for the organization's products and services.

Overcoming these challenges is crucial for the sector's ability to both innovate and remain competitive, especially in a market that is becoming increasingly global. Successfully implementing open innovation strategies is critical for the sector. A key factor will be the development of organizational cultures that support external collaborations and allow for the exploitation of innovations with external parties.

This research will focus on understanding the state of Open Innovation culture within the telecommunications sector in product development and identifying the key factors that promote or prohibit product development and product innovation.

1.4 Research problem statement

South Africa's National Development Plan (NDP) and economic development goals are premised on having a solid and vibrant ICT sector with a widespread digital communication system that is both accessible and inclusive and which drives economic growth (NPC, 2012).

The region undoubtedly faces several systemic challenges, including resource constraints, and continues to be at the back foot of the developed countries in the Global North. Collaborative strategies should be considered to overcome structural limitations and find solutions more rapidly.

As the adoption and practice of Open Innovation in the ICT sector increases and telecommunications operators extend their innovation processes to include external parties, the risk of failure of these initiatives remains high. Despite well-designed change programs, the failure rate of change initiatives of most organizations lingers above 60%-70% (Burnes, 2011; Decker et al., 2012). For the telecommunications sector, which is a critical economic enabler, failure results in businesses being unable to operate and in people being unable to communicate; it compromises national development goals and national security; and negatively affects the country's Gross Domestic Product (GDP). Consequently, South Africa must catch up to the rest of the world's ability to participate in the digital economy.

While many factors have been identified as contributors to change failure, such as such as insufficient education, poor communication, poor planning, lack of leadership support, and inadequate resources, the organizational culture has been identified consistently as an important factor contributing to change failures. (Burnes, 2011; Decker et al., 2012).

Organizational culture reflects the shared values, beliefs, and practices within the organization. In an open innovation environment, culture becomes highly complex due to the increased number of external parties the firm needs to interact with (Bigliardi et al., 2012; Gupta et al., 2007). South Africa, like many African countries, has rich cultural diversity due to the diversity of its citizens, languages, and heritages. The region also has a history of systematic separation. Culture, in the context of the region, is, therefore, an essential influencer on the outcomes of any strategy.

A poor culture affects information flows. This compromises the firm's learning ability, absorptive capacity, creativity, and effective knowledge transfers which in turn lead to failed new product development and innovation.

While there is growing interest in open innovation, there remains limited research on the adoption and implementation of open innovation in the telecommunications industry, particularly in the South African context. There is an even bigger gap in understanding innovation culture and its impact on the success of open innovation.

The research study aims to fill this gap by investigating the open innovation culture in product development within South African telecommunications companies. This will be done by identifying the key factors that influence open innovation culture and the barriers that companies face when implementing open innovation in product development.

1.5 Significance of study

The research study contributes to improving the understanding of open innovation culture and the way culture can be leveraged in applying open innovation within product development to enhance product innovation in the telecommunications and ICT sectors. This assists product development leaders and innovation management leaders in creating *enabling environments for open innovation* and reducing *the failure* rate of open innovation initiatives due to organizational culture.

The research study also enables innovation managers to identify cultural components that affect open innovation in product development. This assists in *improving overall innovation processes* in the South African telecommunications and ICT sector.

The research study also extends the academic discourse and enriches the academic knowledge of open innovation culture in the South African telecommunications and ICT sector.

Finally, the research study also assists policymakers and innovation scholars in the Telecommunications ICT sector with how innovation within product development innovation can be enhanced to improve economic development and economic growth in South Africa and address critical societal challenges.

1.6 Delimitations of study

- The research focuses on open innovation culture in product development within South African telecommunications companies. It does not include other industries or sectors.
- The research focuses on data collected from South African telecommunications companies. The study does not collect data from other countries.
- The research is limited to a single telecommunications organization operator, which is a market leader in South Africa. The study does not include other operators.
- The research uses qualitative research methods including interviews with product management and innovation management teams who are the primary custodians of product development and open innovation and analyzing academic literature. The research does not include quantitative research methods.
- The research focuses on a single point in time. Data from outside this time frame will not be included.

- The delimitations of the study ensure that a relevant and in-depth understanding of open innovation culture within product development in a South African telecommunications sector can be achieved. At the same time, the generalizability of the research may be limited. The heterogeneity of the sector and the rich findings will generate practical findings that can be applied to change initiatives and enhance the relevance of the subject in academia and the sector in the country.

1.7 Research question

The research seeks to understand how South African telecommunications operators can create organizational cultures that enable open innovation within their product development. These organizational cultures should reduce the failure of open innovation initiatives within their telecommunications operators and similar organizations in the ICT sector. The study's research questions are:

1. Is there an existence of innovation culture dimensions that motivate the success of open innovation within South African telecommunications product development?

2. What is the relative importance of the innovation culture dimensions within South African telecommunications product development?

3. Are there recommendations for the industry that could improve the success of open innovation within South African telecommunications product development?

1.8 Outline of Study

The research study is structured as follows.

Chapter 1: This section provides the research background, the aims of the research, and the rationale for the research.

Chapter 2: This section reviews the existing body of knowledge and develops a theoretical framework used to develop the research propositions.

Chapter 3: This section provides details on the research design, data collection methods, and data analysis methods used.

Chapter 4: This section presents the research findings from the data collected.

Chapter 5: This section analyses and discusses the data against the theoretical framework in line with the research objectives.

Chapter 6: This section provides a conclusion for the research and gives recommendations for the direction of future studies on the research subject.

1.9 Summary of chapter

The ICT sector is constrained by several systemic factors that impede innovation, such as a lack of infrastructure, a lack of investment, and a lack of an enabling regulatory environment (ICASA, 2022). Amongst these are also organizational culture challenges that constrain innovation. In response, South African telecommunications operators and other organizations in the ICT sector are increasingly adopting open innovation strategies in order to overcome these challenges and enhance product innovation (Bigliardi et al., 2012). These open strategies involve collaboration with external parties at various stages of product development to enhance outputs.

The research questions defined are aimed at understanding the organizational culture and how it can be leveraged to improve the success of open innovation in product development.

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

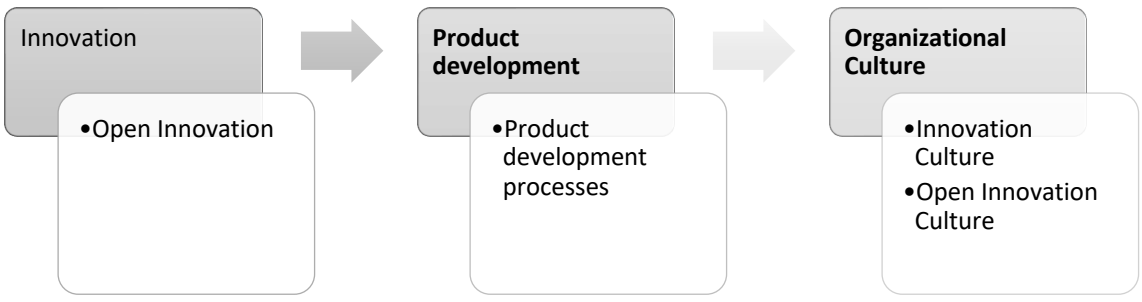
The review of literature seeks to explore the existing knowledge base on organizational culture in open innovation and product development telecommunications sector in South Africa.

The literature review was undertaken by reviewing academic publications, books, and industry publications related to the research topics. The review focused on the core theoretical concepts, including Open Innovation, Organizational culture, and Product Development. The research prioritized research literature conducted in the telecommunications and ICT sectors to acquire a sound understanding of the theoretical concepts in the sector. Due to the limited research specific to South Africa, data from similar technological sectors was used, including local industry reports. The literature review further informed the research constructs related to the core theories ensuring an appropriate research design that was able to achieve the research aims.

Additionally, the review identified gaps in the literature, particularly in the South African context, and provided recommendations for future research.

The Literature review is arranged as follows:

Figure 1: Literature review layout



The following review literature discusses findings on the above central theoretical foundations of the research.

2.2 Innovation

The subject of innovation has gained widespread global attention and focus due to its ability to drive economic growth, solve societal problems, and enhance organizational performance. The concept has varied definitions, including a process for firms to put into practice designs and techniques that are new (Nelson & Rosenberg, 1993), new or significantly changed processes or products (Gault, 2018), or a new combination of ideas, capabilities, and resources (Fagerberg, 2004). The concept can be described *as the process of creating new or improving products, services, processes, or business models that create value.* Innovation can leverage creativity to create value.

The widespread acceptance of innovation in business management was largely influenced by endogenous growth economists who argued that economic growth could be generated internally. Under the endogenous growth theory, scholars advocated that economic growth was not only predicated on exogenous factors outside the firm, but by factors such as intellectual property, new ideas, human capital, and R&D investments which would increase output, thus increasing economic growth (Acemoglu, 2002; Krugman, 1991; Lucas Jr, 1988; Romer, 1990; Stiglitz, 1987). This has shifted the rate of technical change from an external factor to an internal factor and focused on firm-level innovation leading to the current considerations in organizational structures and investments. This has led to innovation being deemed critical for business growth and economic growth and the business (Romer, 1990). The criticism against the endogenous growth and innovation perspective includes the lack of generalizable empirical evidence, the assumption of perfect competition, and challenges in measuring constructs such as knowledge and ideas (Chirwa & Odhiambo, 2018). Arguably, the number of organizations and states that have achieved significant growth due to technological innovations presents a strong case for the argument (Viotti, 2002; Wu et al., 2009).

The impact of innovation on business and the economy has made innovation a state-level agenda in many developing economies. In South Africa, the Department of Science and Innovation, formerly Science and Technology, has

identified innovation as a primary driver for economic growth, job creation, and economic development and has set out policies to drive the agenda (DSI, 2019).

A major critique levied against African states has been that the region lacks well-organized innovation systems that have the capability to stimulate, fund, and successfully diffuse innovations (Chaminade et al., 2018; Oyelaran-Oyeyinka, 2014; Padilla-Perez et al., 2009). A NIS can be described as a network or system comprising a number of actors whose interactions and quality of interactions influence the rate of innovation. These systems can exist at a firm (micro-level), in a region or sector (meso-level), and at a national or geo-political level (macro-level) (DSI, 2019; Lundvall, 1992; OECD, 1997). In comparison to the Global North, Chaminade et al. (2018) characterized NIS in the Global South as loosely coupled with weak connections resulting in low rates of innovation, especially in the science and technology sectors. A strategic objective for the South African state is therefore the building of a strong National Innovation System.

The state plays an active role in coordinating players in the region to ensure that innovation is inclusive, supporting knowledge creation, investment, and innovation diffusion within the sector. A strong focus has been to ensure that there are clear links between academia, where primary knowledge generation takes place, businesses where innovation is developed and commercialized, and the state, which creates a free and fair environment for innovation to thrive. In addition to the triple Helix (Government, Academia, and Business) (Etzkowitz & Leydesdorff, 1995), the South African government has placed a strong emphasis on leveraging indigenous knowledge and on involving the local communities in developing innovation (DSI, 2019). Supporting the criticism by Viotti, traditional NIS systems were narrowly focused on science and technology, while in the Global South these should be widened to take into account complementary actors and activities such as culture, traditions, indigenous knowledge, etc. (Viotti, 2002).

The concept of innovation is vast as innovation varies in type and degree. The types of innovation include product innovation (tangible), process innovation, and business model (conceptual) (Goffin & Mitchell, 2016). This enables products to be enhanced not only through new product introductions but also by enhancing

the supplementary business processes and ways the products are taken to market. Innovation also varies in degree ranging from incremental innovation, wherein there are minor improvements made to products and services that are existing, often providing a performance increase benefit. At the other end is radical innovation, where breakthrough products are developed. Incremental innovation is often a lower-risk strategy intended to enhance value for existing customers. In telecommunications services, this is being witnessed in the higher maturity services like voice and data where the services are being optimized for better performance i.e. speeds, whilst radical innovation is a high-risk strategy often seen in new services which are intended to enter or create new markets (Pisano, 2015) i.e. next generation networks and virtualization.

In the telecommunications sector, operators have had to meet the increased needs of customers such as high volumes and connectivity speeds, and also meet the needs of a wider customer base as telecommunications becomes an expected human right. There has thus been a need to develop new technologies to meet these needs. Factors that have been identified to influence the level of innovation include public policy, investment, infrastructure, culture, and a national innovation system that promotes inclusivity, and an efficient information flow amongst all actors that promotes knowledge and technology transfers (Bigliardi et al., 2012; Kosaroglu & Hunt, 2009).

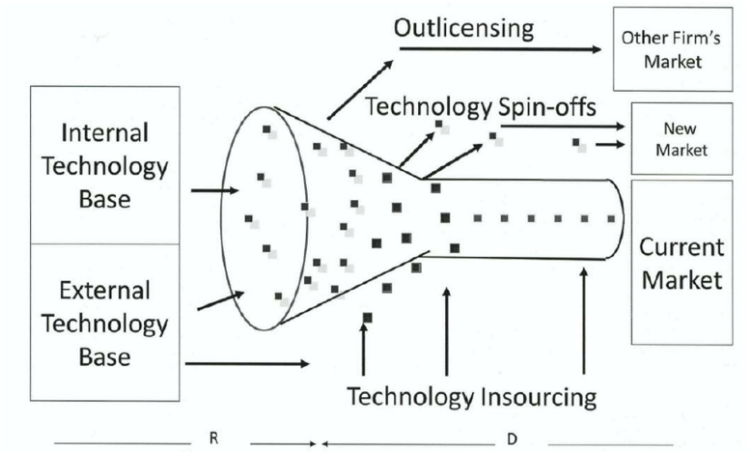
As organizations, nations, and individuals grapple with challenges, innovation is presenting itself as a new vehicle that can be leveraged to think differently about challenges by combining resources in new ways and finding solutions that create value.

2.2.1 *Open Innovation*

Open Innovation is a strategic innovation model that has gained prominence in organizations, both private and public, as a means to accelerate innovation and extend an organization's innovation capabilities by externally seeking ideas, resources, and knowledge that can be incorporated into the firm's innovation processes. The theory is defined as 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation' (Chesbrough, 2003). The concept is premised on the pragmatic acceptance that there are valuable resources not within the organization that the company may be able to leverage. Open innovation is a significant shift from traditional innovation models described as 'closed innovation' wherein the complete innovation process was contained within the firm from ideation to commercialization.

Open Innovation as a concept and a widely accepted term gained prominence in management and academia from its popularisation by Chesbrough in 2003. Open innovation explains two main phenomena in the innovation processes namely: *Intellectual property (IP) management processes* – how companies produce, get, safeguard, and exploit intellectual property to their advantage in order to remain competitive. This process results in IP as a strategic asset for the organization that can be traded to generate revenues (i.e., trading underutilized assets, patent agreements, etc.) assets generate new knowledge assets over being only used as a defensive tool. Secondly, *Innovation management processes* – how organizations improve the innovation process through integrating internal and external information flows i.e. extending the innovation boundaries of the organization (Benezech, 2012). Open innovation can adopt an outside-in model where outsides are sourced from outside the organization and leveraged inside or internal ideas are leveraged outside allowing for innovations to be taken to market via various methods such as licensing, spin-offs, and offerings to existing customers (Chesbrough, 2003). The image below is a diagram of the open innovation model by Henry Chesbrough (2003).

Figure 2: Open Innovation Model (Chesbrough, 2003)



A similar, but varying concept of open innovation, is proposed by scholars such as von Hippel. It similarly advocates for external collaboration in order to enhance innovation but believes that this should be without regard to profit or protection of intellectual property to others. Open innovation is thus defined as innovations that have economic importance that are developed by users and other people by dividing the tasks, work, and costs of development among each other, and as they do so they freely reveal and share their results (Von Hippel, 2014). While the definitions by Chesbrough and Von Hippel are different, they share the same core principle of leveraging external communities to enhance innovation.

The criticism levied against the open innovation model is that it introduces additional organizational management complexity due to the need to manage multiple partners, including those outside the organization. This requires structures and communications that can span across and outside the boundaries of the organization effectively. In addition, open innovation introduces complexity in managing intellectual property, company information, and the flow of data which exposes the organization to potential patent liabilities of not being effective. An additional complexity cited is that of managing customers and service quality. As customers are collaboratively owned, there is a risk that they may receive poor customer experience from one partner, which tarnishes the brand of all associated partners (Grönlund et al., 2010).

In the ICT sector within the region, open system models such as open innovation are considered as a way to fast-track the development of the sector through

knowledge transfers. Knowledge transfer refers to the *movement of knowledge from one organization or individual to another. This can include skills, information, or expertise* (Bacon et al., 2019; Su et al., 2019; Szulanski, 2000). Knowledge transfers can bridge the knowledge gap that exists between the developed Global North and the developing Global South and accelerate catch-up in the sector. Collaborations, especially with more developed economies that are strong in pioneering new and original innovation are cited as a critical enabler for 'catch-up' and secondary innovation. Catch-up, which is a model from developing economies to catch-up to the incumbents in the developed nations, is premised on acquiring adequate knowledge and then exploiting a market opportunity to surpass the incumbents.

Similarly, secondary innovation, which is an innovation that is based on developing something new or varied through adapting, modifying, and combining existing original innovations to address different needs and solve new problems (Wu et al., 2009), is based on acquiring adequate knowledge to allow further development. The knowledge acquisition process is a learning system that is achieved through learning processes such as learning by searching; learning by doing; learning by using; and learning by interacting.

Whilst initially knowledge is gained using the original innovation from outside the country, in time, local actors begin to search for new ways to apply their knowledge and the original innovation leading to new knowledge generation and further development of original innovations (Lundvall, 1992). An Innovation System that has an effective movement of innovation amongst the actors becomes a cornerstone for technology transfers allowing for cross-sectoral information and knowledge generated to move from R&D stages to commercialization and value realization. Such a system enables technology transfer to happen more effectively by promoting collaboration between knowledge generators and knowledge users.

Telecommunications organizations are pursuing open innovation because it provides opportunities to access a wider resource pool of skills, technologies, and knowledge and enhances interoperability. In addition, this strategy improves the ability of service integration which often spans multiple partners, platforms, and

regions and creates opportunities to explore more business models. Various methods for collaborations have included crowdsourcing, creating online platforms, offering rewards for innovation, or co-creation partnerships. All these improve the rate and the quality of products and services. Open innovation should also be considered a risk management strategy as it reduces capital outlay and spreads it across multiple partners.

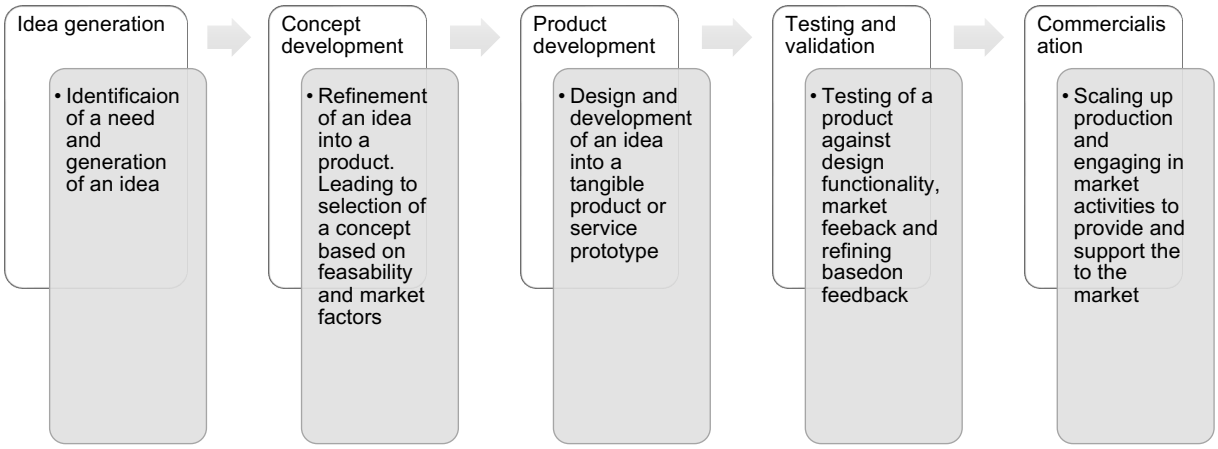
2.3 Product development

Products and services are responsible for generating the lion's share of most organization revenues, especially in the telecommunications sector. The product development process, also called New Product development (NPD), is the process of creating new products or services or improving existing products and services in order to meet customer needs and achieve the organization's strategic goals (Gupta et al., 2007; Kahn et al., 2013). Grönlund et al (2010), cite that one of the reasons why organizations fail to sustain a sufficient internal commitment to open innovation to realize its benefits is because of a failure to adapt their product development process to open innovation.

Product development is responsible for ensuring that products developed within the organization are delivered timeously, are of high quality, meet the customer's needs, and provide a competitive advantage. These objectives have placed a focus on the importance of innovation within product development both at the process level (how products are developed) and at an output level (what products are developed).

New Product Development entails identifying the customer need; developing a concept to meet the needs (market research, needs analysis, science, and technology research); developing the product (creativity, prototyping, market validation,); and commercializing (business model development, funding, production, marketing, customer support). The figure below illustrates the common stages in a product development process (Cooper, 2014; Goffin & Mitchell, 2016; Grönlund et al., 2010; Kahn et al., 2013).

Figure 3: Common stages in the product development process



To complete these steps a variety of skills is required, ranging from engineering, design, and marketing, to sales. In many organizations, the process will therefore include multiple functions coordinated by a central product or project management office (Carbone, 2005). Over the past few decades, particularly from the 20th century organizations have understood the inextricability of the tight coupling of the various functions and their impact on the overall delivery of services to customers. In response, they have had to develop capabilities on how to effectively manage and coordinate these interactions and drive effectiveness and efficiencies amongst the various functions.

A key role in managing a coordinating this process is product development. Product managers play a crucial role in product development, driving the success of a product throughout its lifecycle. This function bridges the gap between stakeholders, such as customers, development teams, and executives, to ensure the product meets market needs and aligns with the company's strategic goals. Product managers define product strategy, gather the product requirements, manage the product portfolio, prioritize features, execute the product roadmap, and coordinate the cross-functional teams in the development process, ultimately contributing to the success of the product and the organization (Cagan, 2017; Haines, 2014).

There are various product development methodologies many of which are based on various project management methodologies including Waterfall, Rapid Application Development, Scrum, Rational Unified Process, and Agile. The two dominant approaches are a traditional 'stage' approach such as the waterfall, or stage-gate model. This is a sequential approach to product development where each step in the development process must be completed before the next step can commence. i.e. gathering the requirements of a product, analyzing the requirements, designing the product, implementing, validating, and maintaining the product (Awad, 2005). The criticism levied against this approach is that it needs to be more responsive to the pace of the market, emphasizes documentation, and is rigid in its approach as it has clear delineations and steps that must be undertaken before the next can commence.

Contemporary methods proposed are agile methodologies such as Extreme Programming, Lean development, Kanban, and Scrum. This is an iterative approach that promotes incremental development. Under this approach, the various stages can take place concurrently, the product development is also broken down into small increments that can be developed quickly and provided to the customer to get feedback before the complete product can be developed (Dingsøyr et al., 2012; Sutherland et al., 2001). Criticism of this approach is that it is not effective in large teams, is reliant on individual skills, and it has a poor documentation culture which may result in miscommunication (IARM, 2014; Walczak & Kuchta, 2013)

Traditionally product development in organizations has taken place internally, wherein activities such as research, knowledge generation, development, and commercialization are the result of internal activities with little to no external information flows or collaboration. This approach has led to organizations developing a strong resource-based view approach leading to robust processes built with an internal focus and leveraging internal capabilities (Grönlund et al., 2010). These closed product development processes, often termed ‘closed innovation’, are characterized by well-defined internal processes, dedicated R&D functions, clear lines of decision-making internally, and internal marketing functions.

2.3.1 *Open Product development*

The challenge faced with these closed product processes is that they have not been geared for interaction with resources outside of the organization, which has led to the failure of open innovation in many organizations (Grönlund et al., 2010).

Idea management - Under a closed product development process, ideas, and research are generated internally. In an open system, ideas flow bi-directionally. This process, described as the 'fuzzy front end,' must support ideas coming in from various external parties into the organization that the organization deems beneficial (Goffin & Mitchell, 2016) and also enables ideas to filter out that the organization believes could better be suited for exploitation externally (Chesbrough, 2003; Grönlund et al., 2010). A benefit widely cited for open innovation is that it increases the quantity and diversity of ideas and widens the pool of opportunities that the organization may not have been aware of, and also allows organizations to profit from ideas through other parties. However, a challenge cited against open innovation is that additional complexity is introduced in managing a high volume of ideas and the associated intellectual property rights of ideas (Arrigo, 2018; Grönlund et al., 2010).

Product development and portfolio management - Product development and portfolio management entail selecting the right combination of products to maximize value and best support the strategic objectives and supporting these with the right resources (Kahn et al., 2013; Meifort, 2016). In a closed development process, resources, and combination products are those within the boundaries of the organization. In an open environment, this requires managing a collation of products and resources that do not always reside within the organization and include a number of external parties. A benefit of open innovation is that products can be developed with shared costs, knowledge, and resources of other parties, and products can leverage combinations of products outside the organization. A further benefit is the knowledge spillovers and knowledge transfers that take place when collaborating with external parties that service in order to increase the capabilities of the product teams (Bacon et al., 2019). However, a challenge cited against open innovation is that this requires

different complex contractual agreements, and business models to drive returns and diverse lines of liabilities (Grönlund et al., 2010).

Product Commercialisation – Product development entails undertaking activities to develop and support a market. This includes scaling up production to support demand, marketing and creating demand for the product, and supporting customers within the product (Kahn et al., 2013). In closed product development, these activities are supported by the organization's own resources. In open innovation, organizations co-market products, pool investment to scale products, and collaboratively support customers to increase their reach. Another benefit cited in open innovation is that leveraging multi-stakeholder collaboration supports better product diffusion and market adoption, which increases product uptake and sustainability in the market. However, a challenge cited against open innovation is that there are increased complexities in management and customer integration and that there is a loss of control of quality and customer support which may result in reputational damage (Grönlund et al., 2010; Mortara et al., 2010).

For industries that require a large amount of standardization across an organization such as telecommunications, closed product innovation and development processes have been criticized because they lead to the development of standards that are not interoperable, which increases user costs. They also lead to duplication of R&D costs as organizations research in silos. Ultimately this slows down the overall rate of sectoral innovation (Forbes et al., 2011; Gupta et al., 2007). A consequence of this is the intervention of regulatory and standardization bodies to facilitate cross-collaboration from various actors. This lack of open collaboration from large organizations has become a considerable public policy debate due to its impact on the future of the digital economy e.g., user costs, monitoring, and oversight, Collaborative product development in varying degrees is seemingly a process that cannot be entirely avoided in the sector.

A challenge faced by the product development functions is balancing the need for innovation, the efficiencies within the process (costs vs profits), and the competitiveness of their products. To overcome some of these challenges,

product development teams are starting to increasingly encompass more external information flows and collaborations to accelerate product development.

2.4 Organizational Culture

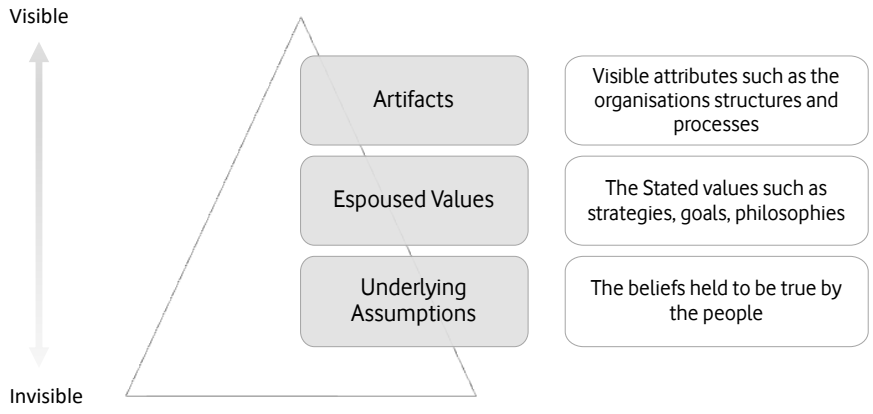
Scholars largely agree that the successful execution of any strategy within an organization is heavily influenced by the culture of the organization (Beitsch & Moran, 2014; Cameron & Quinn; Hofstede et al., 1991; Kieser, 1994). Failure to pay attention to organizational culture has been identified as one of the leading drivers of failed organizational change initiatives (Cameron & Quinn, 2006). As organizations globally seek to change and adopt innovation strategies, the subject of the influence of culture has become increasingly important.

Scholars have found that organizational culture is a critical factor in how groups form a collective identity amongst themselves, additionally how organizational culture creates predictability and uniformity in how the groups address external challenges and respond to problems. For business, this has led to the realization that positive organizational culture results in increased employee motivation, higher levels of engagement, higher financial performance, increased creativity and innovation, higher employee retention, and more effective communication (Beitsch & Moran, 2014; Cameron & Quinn; Kieser, 1994).

Hofstede (1998) referred to organizational culture as ‘the collective programming of the mind’; under this definition, the focus was on the collective cognitive assimilation of the minds within a group of people. Schein (1998) described organizational culture as a 'pattern of shared basic assumptions, a definition which focuses on how groups evolve to form a uniform understanding and interpretation of the world around them. Cameron & Quinn (2006) cite that organizational culture reflects the prevailing ideologies amongst people that convey the people's identity and guidelines for their behaviours ‘*It reflects the ideology people carry inside their heads.’* Organizational culture can therefore be described as shared belief systems formed among groups that evolve, informing their behaviors and how they respond to the world.

Edgar Schein's framework (1992) is a widely accepted model for understanding organizational culture and it asserts that culture is a multi-dimensional construct that must be understood on three levels which include constructs that are both visible and invisible. The three levels are artifacts, espoused values, and underlying assumptions. Artifacts are the first and most visible layer. This outer layer can be reflected by the organization's structure, language, dress, rituals, and organizational space. Espoused values are the second level and are often reported by management as core to the organization and often reflected in strategies, principles, and codes of conduct. The third level, underlying assumptions, involves deeply ingrained beliefs that dictate daily work practices (Schein, 1992). The figure below figure depicts the organizational culture model by Schein.

Figure 4: Adaptation of Schein (1992) Organization Culture model



Values are described as deeply embedded standards for discerning what is good and just in society (Little et al., 2014). Rokeach's influential definition characterizes values as enduring beliefs about preferable modes of conduct or existence (Rokeach, 1973). Gamage emphasizes values as virtues reflecting inner realities, influencing habits, behaviors, and attitudes (Gamage et al., 2021).

Values, in both descriptive and normative functions, relate closely to ethics and morality. Descriptively, values characterize individuals or develop meaning in specific contexts, while normatively, they inform ideals and objectives, whether considered timeless and universal or relative and contextual (Askeland, 2020). Values therefore serve as fundamental guiding principles shaping decisions,

actions, and interactions with the world and are crucial for formulating and transmitting beliefs and culture (Askeland, 2020; Cameron & Quinn, 2006; Schein, 1992).

Beliefs are described as principles or convictions that people hold to be true (Little et al., 2014). They are fundamental convictions about events, causes, agency, and objects that people use and accept as true (Connors & Halligan, 2015). Beliefs are fundamental aspects of human cognition that shape understanding of the world. They form the deeply rooted underlying assumptions of culture are often enduring, unquestioned representations of the world that are psychologically held (Connors & Halligan, 2015; Richardson, 1996).

Beliefs can formulate without absolute proof, knowledge, or rationality and can also formulate below the awareness level of people due to the rapid speed of the nervous system. Linked to organizational culture, beliefs are a primary attribute influencing decision-making and employee engagement (Connors & Halligan, 2015; Seitz & Angel, 2020),

Schneider emphasizes that organizational culture is a complex multifaceted phenomenon and references Schein's framework to demonstrate this arguing that while artifacts may be highly visible and look the same they can be ambiguous in terms of understanding and the underlying meaning to people, that values whilst espoused may not align with the reality experienced by people and that underlying assumptions may be so deeply ingrained that can be hard to articulate or identify without tools like in-depth interviews (Schneider et al., 2016).

Scholars have also identified that culture is not always positive and that within organizations a negative or toxic culture can develop. Consequences of these types of negative cultures can be poor morale, increased levels of non-compliance, resistance to change, and a high churn rate. Alvesson (2002) describes six types of organizational cultures that can be detrimental to an organizations effectiveness and limit the organization's rate of innovation. These include *anonymity*, a culture where individuals feel invisible, and lack a sense of identity within the organization; *conformity*, a culture where there is strong pressure on individuals to conform to norms; *politicization*, a culture where the

organization is dominated by policy and authority; *silos*, a culture where departments operate separately, each pursuing goals without collaborating; and *inertia*, a culture where there is high resistance to change and adaptation. Unhealthy competition, is a culture that is excessively competitive and fosters internal competition that impedes growth (Alvesson, 2012). Toxic cultures can hinder the effective flow of information and trust, ultimately compromising the organization's objectives.

Several scholars have done significant work investigating the factors or dimensions that make up culture, supported by a variety of frameworks to enable the understanding and assessment of culture. Prominent works, including their cultural dimensions have included (see Table 1):

Table 1: Organizational Culture Models

#	Model	Dimensions/attributes
1	**Hofstede Cultural dimensions** (Hofstede et al., 1991)	Power distance, Individualism vs. Collectivism, Masculinity vs Femininity, Uncertainty avoidance, and Cofunction dynamism
2	**Hofstede Onion Model** (Hofstede, 2005)	Values, Rituals, Heroes, Symbols
3	**Cultural Webb Model** (Johnson, Scholes, 1992)	Rituals, Symbols, Power Structures, Organizational Structures, Stories, Control Systems, and Routines
4	**Competing Values Framework (Cameron & Quinn, 2006)**	Clan, Adhocracy, Market, Hierarchy

These studies have revealed that culture is a multi-dimensional concept that includes a variety of attributes. In the interpretation of the organizational culture Alveson (2012) cites that practitioners and scholars should avoid common pits that include treating culture as though it is a simple physical good; describing cultures as a few simple attributes or taking a wide view of culture and including everything as culture; consensualizing culture and thinking that culture means unity and alignment, defining culture in terms of formal or legal boundaries

(Alvesson, 2012); and idealizing culture which is viewing it as a construct devoid of this social and environmental surroundings.

Culture manifests at multiple levels which include intangible elements such as beliefs and values and tangible elements such as artifacts and structures. Culture is not static: within any organization at any given time, there are competing cultures within an organization that manifest themselves based on the context.

In an environment, where there is a high diversity of belief systems, structures, and environments, culture becomes increasingly complex and harder to manage (Bigliardi et al., 2012; Gupta et al., 2007).

2.4.1 *Innovation Culture*

An innovation culture is a culture that encourages the appropriate behaviours that give people ownership of the innovation efforts (Goffin & Mitchell, 2016). It is described as a behaviour of shared creativity within groups that benefits not only the individual but the group and the wider society (Hanifah et al., 2017). When successfully nurtured, an innovation culture creates an environment in which there is a strong shared belief that creativity is not only limited to leaders or a select group of people but that everyone in the organization is welcome to identify methods and ways of doing things both differently and better.

A culture that breeds innovative behaviours is underpinned by psychological safety for the employees. This is a shared belief by an employee or those within a team that it is safe to take risks. This is a strong belief that it is safe to come up with ideas, to ask questions, or to raise concerns with our fear of negative consequences (Baer & Frese, 2003; Edmondson, 1999; Klajkó et al., 2020). Psychological safety enables open communication and improves the flow of information and trust among people; it further promotes learning by removing the barriers to knowledge acquisition. Ultimately, it promotes risk-taking, which has been identified as critical for innovation.

In telecommunications services where there is a high rate of technology change, innovation culture is vital for creating an environment that enables solution-finding, creativity, risk-taking, and exploration across the organization.

To assess and measure innovation culture, Dobni (2008) identifies four dimensions of innovation culture, namely intention for innovation, infrastructure for innovation, market orientation, and implementation. The factors signify that innovation culture is a multidimensional and contextual (Dobni, 2008) and that successful innovation culture is characterized by shared competencies and open communication flows across organizational functions. Similar attributes are identified by Johansson Alm (2014), namely innovation readiness, creativity and learning, leadership, entrepreneurship, market orientation, motivation, and relations (Johansson Alm & Jönsson, 2014). In an open culture, these exchanges are extended to external members of the value chain (Kratzer et al., 2017).

Table 2 below summarises the Innovation cultural dimensions identified by Dobni (2008).

Table 2: Innovation Culture dimensions (Dobni, 2008)

#	Constructs	Description
1	Intention for innovation	The extent to which an organization has a formally established innovation model (strategy, goals, communication, etc).
2	Infrastructure for innovation	The extent to which the organization has support systems that capacitate employees for innovation (learning systems, opportunities capacity and empowerment (capacity, training)
3	Market orientation influence for innovation	The extent to which an organization has market awareness to sense and respond to needs and drivers of innovation
4	implementation context for innovation	The extent to which the organization can direct its activities to create value for its clients or customers. Their ability to successfully execute their strategies.

Convergences in the literature broadly describe an innovative organization culture as one that is *deliberate about innovation* which could be observed through strategies, plans, and values. An organization that *develops structures that enable innovation* could include learning systems, processes, resource

allocation, and systems that enhance the free flow of information and transactions that support innovation. An organization that has a *market orientation* is highly attuned to customers and other actors in the value chain. This could be observed through the understanding of the market and the presence of strategies geared towards achieving a solid market position. An organization that has *leadership and management* that promote innovation could be observed through leadership styles, power dynamics, reward systems, and the degree of autonomy employees are given and an implementation context that delivers value through its efforts (Cameron & Quinn; Dobni, 2008; Johansson Alm & Jönsson, 2014).

2.4.2 *Open Innovation Culture*

The International Standard of Innovation ISO56002, the International Standards Organisation (ISO) states that the innovation capabilities of an organization include the ability to collaborate with external parties and that a culture must be created that supports co-existence and creative operations to enable innovation (ISO, 2019). As organizations increasingly look to external sources to participate in innovation activities, there is an increased need to develop organizational culture that nurtures external collaborations leading to enhancement to the levels of innovation.

Open Innovation Culture is a '*learning process within organizations where successful answers or responses to environmental challenges are accepted as basic assumptions and norms and transferred to the organization's set of assumptions and norms*' (Nestle et al., 2019). Within product development, open Innovation Culture can be described as the shared mindset and practices adopted by the organization to actively seek out, incorporate, and build in external ideas and resources into the organization's product development process. Such a culture is collaborative, adaptable, and flexible.

Several cultural issues that impede open innovation have been identified, such as a lack of trust amongst the partners, weak structures to manage the flow of ideas and internal resistance. Some of the causes of fear within employees include fear of loss of power or position, while some of the concerns for organizations include risk of loss of IP or failure to benefit from collaborations and

low tolerance of risk (Mortara et al., 2010). Additionally, firms can have a bias towards external knowledge, this is referred to as the Not Invented Here (NIH) syndrome, which is a resistance towards external knowledge and is described as a tendency or attitude of rejecting information, resources, or products not developed internally, citing reasons such as concerns of quality, IP infringement, or not acknowledging value, etc. Another version of this is the Not Sold Here (NSH) syndrome, which is the resistance toward sharing internal knowledge. This is described as a tendency not to share knowledge because of a fear of losing a competitive advantage. Both these cultural attributes can effectively hinder the flow of knowledge in open systems and prohibit open innovation. (Amann & Granström, 2019; Chesbrough, 2010; de Araújo Burcharth et al., 2014). As innovation within the organization can be considered a function of learning and new knowledge creation (Andersson et al., 2020), such attitudes and beliefs regarding information sharing can hinder successful innovation.

In telecommunications products and services, there is a large degree of collaboration with multiple suppliers, partners, and customers, all of which are distributed globally. As a result, culture has been identified as a critical factor in the effectiveness of innovation in product development.

2.5 Summary of Literature Review

The literature review indicates that organizations in telecommunications and the wider ICT sector are looking to innovation as a strategic tool to improve competitiveness and meet customer needs and that at a national government level, innovation is being considered a means for achieving national goals of economic growth and development. **Innovation** is described *as the process of creating new or improving products, services, processes, or business models that create value* (Fagerberg, 2004; Gault, 2018; Nelson & Rosenberg, 1993). Innovation can be both tangible i.e. products or intangible i.e. processes and can be small i.e. Incremental or big i.e. breakthrough. Innovation has become an imperative for governments and organizations in order to accelerate economic growth and drive economic development. For innovation to thrive, there is a requirement for a *network of diverse actors to engage, share information, and collaborate in order to stimulate innovation, generate knowledge, fund innovation development, and diffuse innovations*. This *National Innovation system* influences the rate of innovation in a country's (Lundvall, 1992; OECD, 1997). Developing economies have been found to have weak and loose connections among these actors who include government, universities, and businesses (Chaminade et al., 2018; Padilla-Perez et al., 2009).

To achieve their strategic goals, telecommunications organizations are pursuing various innovation models. One such model that is gaining prominence is Open Innovation (Bigliardi et al., 2012; Birudavolu & Nag, 2011). **Open innovation** is described as a *distributed innovation model that incorporates external ideas and resources to enhance the organization's product development processes* (innovation processes) (Chesbrough, 2003). Many operators around the world are increasingly adopting this model as a way of enhancing their innovation processes. Open innovation can be inside-out i.e. internal ideas and resources going out or outside-in i.e. external ideas coming into the organisation.

Value creation can be achieved via a multitude of methods, including, licensing agreements, spin-offs, and various other business models. There is a branch within the open innovation paradigm that adopts open-source principles for open innovation. This branch adopts the view that open innovation is collaborative

innovation that involves a number of parties outside the organization. The innovation generated should, however, be free to all users with no intellectual property protection. Under this view, all knowledge is freely accessible to everyone, and value is based on the utilization or consumption of collective innovation. In developing economies, open innovation has been strongly cited as a way to assist the countries to achieve *economic catch-up with the rest of the world through knowledge transfers and knowledge spill overs* from the incumbent developed countries that have pioneered the innovations. Such a situation is also deemed to contribute to secondary innovation, where *developing economies, through learning, can further innovate original innovation by combining them with indigenous resources and solving local problems*. Open innovation also enhances the diffusion of innovations by bridging the gap between creators and consumers. Innovation is an important part of product development which ensures that organisation continue to deliver products and services that enhance customer and organizational value.

Product development, also known as **New Product Development (NPD**), is t*he process of creating new products or services to meet customer needs and achieve the strategic goals of the organization*. The process of developing products involves identifying customer needs, developing a concept, developing the product, and commercializing it. Common stages in a product development process include engineering, design, marketing, and sales. Various *product development methodologies* have been developed in order to manage those processes and drive efficiencies such as Waterfall, Rapid Application Development, Scrum, Rational Unified Process, and Agile, which have been developed to drive efficiencies and coordination among various functions. Traditional 'stage' approaches, such as waterfall and stage-gate models, have been criticized for being rigid, and reliant on individual skills and therefore not being responsive to market needs. New agile methods, such as Scrum, Lean, Kanban, and Extreme Programming, are purported to be responsive as they promote incremental development and allow for concurrent stages to take place. A key role in the process is the *product managers who are responsible for managing the product throughout its lifecycle*, including defining the roadmap,

managing the portfolio, and coordinating cross-functional teams to ensure successful product delivery.

Traditionally, product development has occurred internally within the organization, this approach has led to a strong resource-based view, leading to robust internal processes built with an internal focus and leveraging internal capabilities in order to develop products. These closed product development processes, also known as 'closed innovation', are characterized by *well-defined internal processes, dedicated R&D functions, clear decision-making lines, and internal marketing functions*. These existing processes have been criticized for their inability to support open innovation, which requires collaboration and interactions outside the organization's control and resource base, including managing ideas from outside the organizations and filtering out ideas outside the organization, levering resources outside the control of the organization and commercializing a product with resources outside the organization.

A key contributing factor to the success of open innovation is organizational culture, in particular the subset of innovation culture (Bigliardi et al., 2012; Birudavolu & Nag, 2011). The literature describes **innovation culture** (a subset of organizational culture) as *shared values, attitudes, behaviours, and practices in an organization that support and promote innovation* (Cameron & Quinn, 2006; Dobni, 2008; Schein, 1974). Culture is a multifaceted and complex concept. The management of culture within telecommunications product development is complicated by the distributed nature of the sector (multi-sector, multi-geography, multi-partner). Cultural dimensions that are identified to be supportive of open innovation include a shared value system that reflects a positive belief toward external collaborations; an innovation infrastructure that enables external collaborations; a flexible market orientation that empowers employees and is focused on creating value for customers; and an innovation context that leverages external collaborations to create value.

An **Open Innovation Culture** is described as a *shared mindset and practices that are adopted by the organization to actively seek out, incorporate, and build in external ideas and resources into the organization's product development process*. An optimal **open innovation culture** creates an environment in which

employees feel empowered and capacitated to be creative and to pursue innovative activities that leverage resources outside the boundaries of the organization in order to create value that benefits the employees, the organization, and the wider society.

2.6 Conceptual framework

The conceptual framework in Figure 5 below is based on the existing body of literature and indicates how the research problem will be explored. The framework provides the innovation culture dimensions identified in the literature review. This is further broken down into the sub-factors (constructs) that contribute to the cultural dimension. The measure for each dimension is further specified to clearly indicate how the factor will be evaluated in the research.

The research will seek to determine how the organization's open innovation culture contributes to product innovation and how it can be leveraged to enhance product innovation.

Figure 5: Research conceptual framework

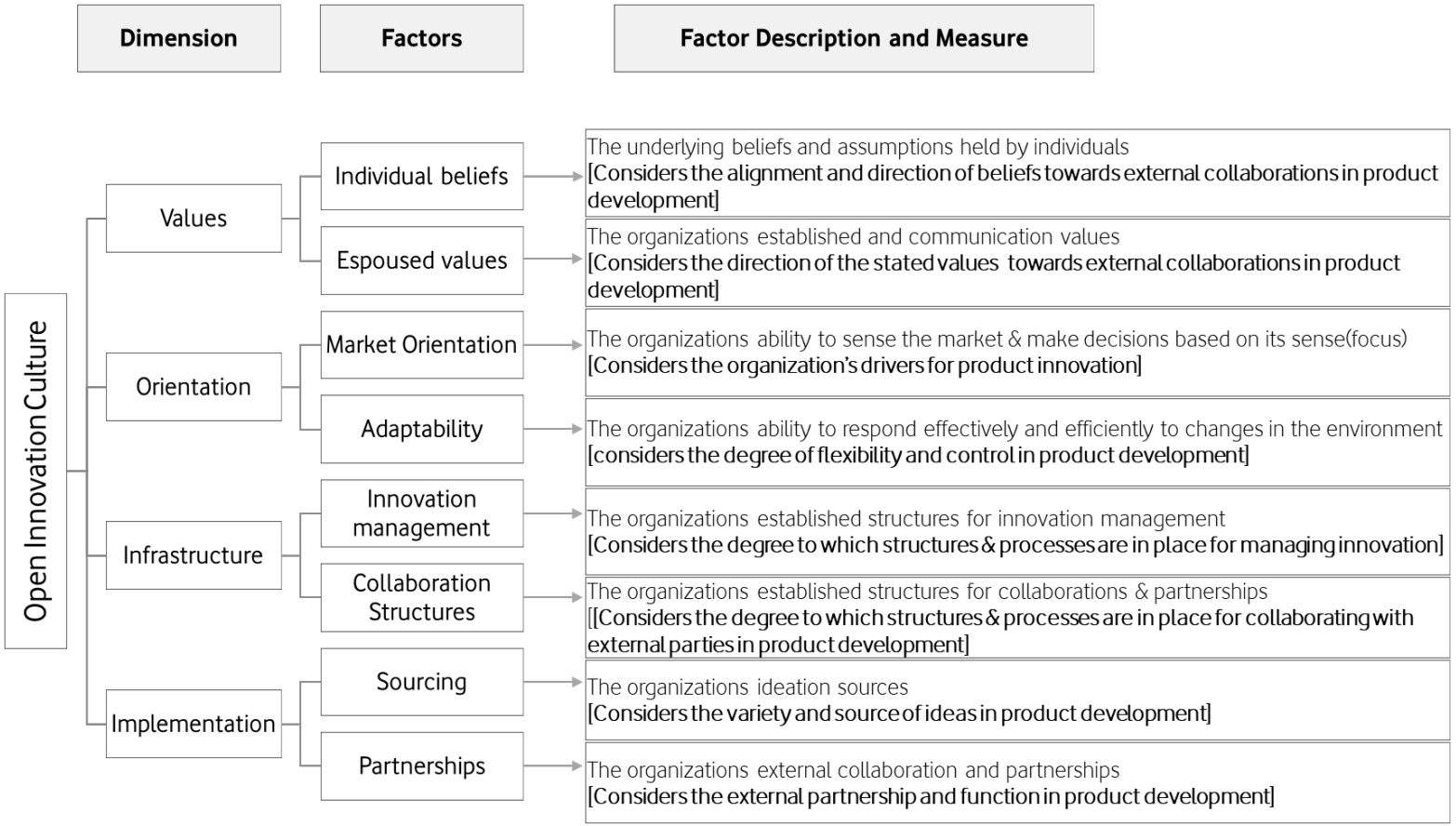


Table 3 below summarizes the relationship between the literature and the innovation culture dimensions identified for the research which are found to have an impact towards open innovation on product development.

Table 3: Innovation Culture dimension aligned to theory base.

#	Culture Dimension	Theory base
1.	Values	• Underlying beliefs, principles and convictions that employees hold to be true (Connors & Halligan, 2015; Little et al., 2014; Seitz & Angel, 2020) • Deep seated and shared basic assumptions by employees that (Dobni, 2008; Schein, 1974) • Espoused Organizational values (Dobni, 2008; Schein, 1974)
2	Orientation	• Market orientation, an external focus towards differentiation & competition as opposed to internal integration & unity (Büschgens et al., 2013; Cameron & Quinn, 2006) • Adaptability, an emphasis on flexibility & dynamism as opposed to stability & control • Adhocratic-market culture (Cameron & Quinn, 2006)
3	Infrastructure	• Organisational structure and strategies designed to promote and enhance innovation (Cameron & Quinn, 2006; Dobni, 2008) • Structure and processes that enable external collaborations (Bigliardi et al., 2012)
4	Implementation	• Ability conceptualize, plan and conduct deliberate effort of planned activity evidenced by outcome (Pfadenhauer et al., 2015). • Usage external collaborations for ideas & resources in the product development process (Chesbrough, 2003; Gupta et al., 2007) • Product innovation enters the markets in various ways (Chesbrough, 2007; Chesbrough, 2003)

2.7 Statement of propositions

From the literature review, four propositions have been developed based on the key cultural dimensions.

Proposition 1 [values]

Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations

Proposition 2 [orientation]

Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable

Proposition 3 [infrastructure]

Telecommunications organizations that practice open innovation have internal structures and processes that are enabling for innovation and external collaborations.

Proposition 4 [implementation context]

Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation.

Table 4 below shows the relationship between the research question and the proposition and specifies how the research findings will be discussed.

Table 4: Proposition and research questions relationships

Proposition	Research Question 1	Research question 2	Research question 3
	Is there an existence of innovation culture dimensions that motivate the success of open innovation within South African telecommunications product development?	**What is the relative importance of the innovation culture dimensions within South African telecommunications product development?**	**Are there recommendations for the industry that could improve the success of open innovation within South African telecommunications product development?**
Proposition 1: [values] Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations	• Alignment of individual beliefs, • Direction of individual beliefs	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
Proposition 2 [orientation] Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable	• Market orientation of product development • Adaptability pf product development processes	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
Proposition 3 [infrastructure]Telecommunications organizations that practice open innovation have internal structures & processes that are enabling for innovation and external collaborations.	• Innovation management processes in product development • Collaboration processes in product development	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
Proposition 4 [implementation context] Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation	• Sources of ideas in product development • Types of partnerships in product development	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*

2.8 Summary of chapter

The research highlighted that achieving organizational goals and promoting economic growth both depend on innovation. An organization's ability to innovate can be accelerated by open innovation, which encourages partnerships with parties outside the organization and makes use of their knowledge and resource bases.

Organizations can therefore improve their products and services through open innovation by choosing the best internal and external ideas that can be more effectively used externally.

In order for open innovation to succeed, the organizational culture must be supportive. Such a culture upholds the proper values towards external collaborations, has a sufficient infrastructure, is aware of the market, and works well with outside parties to deliver value to customers and stakeholders.

The literature review produced a conceptual framework to assist in navigating the research problem and four research propositions to assist in answering the research question.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Research Design

The framework that a researcher uses to collect information and analyse the information is referred to as the research design (Malhotra et al., 2017). The research design adopted must suit the nature of the research and research environment and must enable the researcher to respond to the research problem and objectives (Leedy & Ormrod, 2001).

The purpose of the research is to understand how South African telecommunications operators can create organizational cultures that are enabling for Open Innovation within their product development. The research focuses on culture, which is a complex multidimensional research subject (Cameron & Quinn, 2006; Dobni, 2008; Schein, 1974). The research further investigates the construct in a very particular environment and region in which an analysis of the existing literature in the area indicates that there is very limited prior research. As a result, the nature of the research is exploratory. According to Malhotra and Birks (2017), exploratory research should be carried out on a problem or research area when there is little to no knowledge about the problem, and there has been no comprehensive research done on the problem. This type of research allows the researcher to discover new insights that improve the understating of the topic (Malhotra et al., 2017).

The limited information and the complexity of the research problem require that information be gathered primarily from participants involved mainly in the research areas. The research design will be qualitative and non-experimental. This research design is chosen as the objective of the research is to gain an in-depth and meaningful understanding of the impact of Open Innovation culture on product development within the telecommunications sector in South Africa.

This research design is also chosen as it enables the researcher to have a much deeper exploration of the perceptions and experiences of the participants and will allow the researcher to identify key and comment elements on the research subject. This type of design enables the researcher to probe specific areas

related to the factors of research in order to gain a higher level of clarity. These factors will provide direction on areas of improvement and future areas of research.

The foundation of the research will be based on a systematic analysis of the available literature on the research. This will create the basis of the analysis for the perceptions of innovation within the firm.

3.2 Data collection methods

The primary means of gathering data for the research was interviews. The interview method creates a complete and clearer picture of the research subject when conducting exploratory research (Saunders et al., 2012). The benefits of interviews include flexibility, more control, more detail, and a higher return rate, while challenges include more time to conduct, inefficient for high participant volume, and is susceptible to biases from the interviewer (Mouton, 2011).

Leveraging the literature review conducted, a semi-structured interview guide was developed to ensure consistency and comparability of the responses (Creswell, 2018). Semi-structured interviews provide a common framework for the research areas while also allowing the flexibility of respondents to share personal experiences for each of the research areas (Mouton, 2011). The interview guide compromised open-ended questions, which allowed participants to express their views, opinions, and feelings in a meaningful and detailed manner. Through probing and prompts, the researcher is able to gather more detailed information regarding a specific research area (Braun & Clarke, 2019).

The data was collected in one-to-one interviews conducted via a video conferencing platform. All interview subjects gave their full and unambiguous agreement for all interviews to be recorded. All interviews were recorded with the full explicit consent of the participants. Interviews were later transcribed using video conferencing software and validated by the researcher to ensure the accuracy of data. Prior to the interviews participants were notified of their right to stop the interview should they feel uncomfortable and were also given the opportunity to ask questions relating to the research purpose and objectives. All

recordings and transcriptions were encrypted and stored securely. The transcriptions saved did not contain any personally identifiable information.

This secondary data collection method was a systematic review of the literature related to the subject. This literature base included academic journals and industry reports. This method enabled the researcher to identify the critical variables for the areas of research as well as extend the literature base that already exists (Mouton, 2011).

3.3 Population and sample

A critical part of research is ensuring that the sample is a true and accurate reflection of the population as this enables the researcher to generalize and extend the findings to similar contexts (Mouton, 2011). Where a population is large and heterogeneous, a larger sample is required to maintain the research validity.

Based on the size of the organization and the core function, and roles within the product development, a non-probability sampling technique was selected, specifically purposive sampling. Purposive sampling method used is based on a sample's ability to most accurately reflect the characteristics required to find answers in the research (Silverman, 2013). The research sample included primarily participants who are directly involved in the area of study. This also included all operational levels across all product offices within the organization. This selection ensured a fair representation of the population.

The population of the sample was the organization's product management and innovation office team, which comprises 40 product managers across multiple product portfolios and three innovation managers. The research sample comprised 25 participants, including three innovation managers and 22 product managers from across the organization. The size was considered to be appropriate for the research project as it allowed for a detailed exploration of the participant's experiences and views relating to the subject. Table 5 below lists the research participants included in the study.

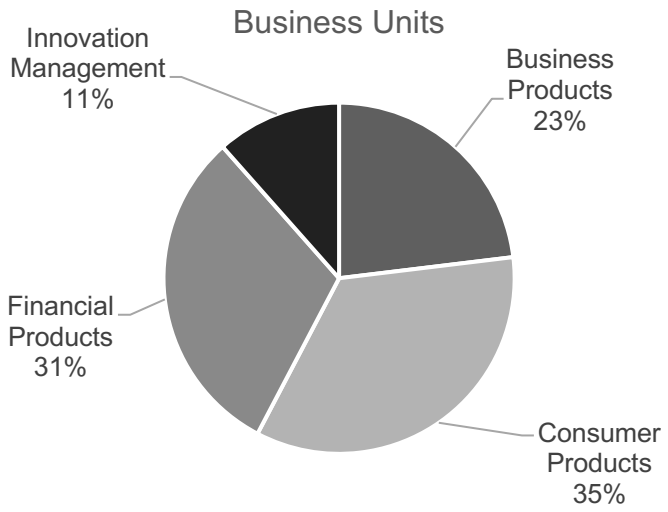
Table 5: Research participants

#	Business Unit	Level
1	Innovation Management	Senior Leader
2	Innovation Management	Senior Manager
3	Innovation Management	Senior Leader
4	Consumer Products	Manager
5	Business Products	Manager
6	Consumer Products	Manager
7	Consumer Products	Manager
8	Financial Products	Manager
9	Business Products	Manager
10	Financial Products	Manager
11	Financial Products	Manager
12	Consumer Products	Manager
13	Financial Products	Manager
14	Business Products	Manager
15	Consumer Products	Senior Manager
16	Consumer Products	Manager
17	Business Products	Senior Leader
18	Business Products	Manager (jnr)
19	Consumer Products	Senior Manager
20	Consumer Products	Manager (jnr)
21	Consumer Products	Senior Leader
22	Financial Products	Senior Leader
23	Financial Products	Senior Manager
24	Financial Products	Manager
25	Business Products	Senior Manager
26	Financial Products	Manager

To ensure that the sample represented all within the functions in the organization who are responsible for product development and innovation management, it included the innovation management office, the consumer product office, the business product office, and the financial services office. The financial services office structure office operates as a stand-alone office with its own management structure and resources but is able to leverage the resources within the consumer and business office. The unit was established as a stand-alone in order to accelerate product development. The business unit composition included 35%

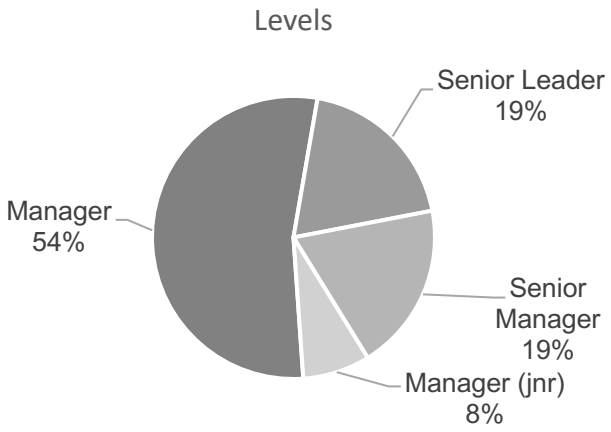
(9) of consumer products. This is the organisation's largest revenue-generating function, 31% (8) of financial products, 23% (6) of Business products, and 11% (3) of innovation management, this is the business unit responsible for developing the organization innovation strategy and coordinating the innovation program. Refer to Figure 6 below.

Figure 6: Research sample business unit type



To ensure that that sample represented all levels within the organization that are responsible for product development and innovation management, it included senior leaders responsible for developing the organization's high-level strategies and managers responsible for developing the organization's tactical strategies and managing the business operations. The sample comprised on 19% (5) senior leaders, 19% (5) senior managers, 54% (14) managers, and 8% (2) junior managers. Refer to Figure 7 below.

Figure 7: Research sample participant level



The research participants were selected using non-probability sampling from a population that was considered to have the most valuable information on the research topic.

3.4 Data analysis strategies and Interpretation

The data analysis strategy selected was a mixed method. This was informed by the nature of the research study and the methods of data collection used, which included interviews and a literature review.

The primary research method selected, which is a qualitative method through interviews, generates rich and detailed information based on the respondents' experiences—these results, which are unstructured, need to be organized to derive meaning and allow for comparison. The primary data analysis method was a thematic analysis and sentiment analysis, which are a widely adopted methods for analysing qualitative data. The secondary analysis technique was a content analysis based on the vast amount of literature and industry reports reviewed. Table 6 below summarises the analysis techniques.

Table 6: Research analysis methods

Method	Description and rational
Thematic analysis	Used to identify patterns and consistent data meaning within a dataset (Creswell, 2018)
Sentiment analysis	Used to identify tones, emotions and feelings within a data set (Creswell, 2018)
Content analysis	Used to identify prominent data, trends, and concepts within a data set (Creswell, 2018)

Saunders et al. (2012) suggest that to derive meaning from qualitative research, the data must be analysed by following three principles: *Data reduction,* which entails cleaning up the data by identifying key elements and keeping those. The categorization can greatly assist in this regard where data is represented under a category or key. *Data display* entails visualizing data in a way which has demonstrates the meaning and shows the connections between the data. Lastly, the *Data conclusion*, where the data meaning is derived to answer the research question (Saunders et al., 2012). This method assists in identifying patterns, themes, and relationships within the data, which can generate key insights regarding the experiences and views of the participants. The data analysis processes entailed:

- The interview audio was transcribed into text using the video teleconferencing software and then validated by the researcher.
- The interview data was analysed in order to identify meaningful data.
- Data was coded based on the literature review and the recurring data sets.
- The coded data was further analysed and put into themes.
- The coded data and themes were arranged and visually represented with graphs and tables in order to derive meaning.

The researcher was better able to comprehend the connections between the data thanks to a visual flow of information (Saunders et al., 2012). The data collected generated meaningful insights relating to open innovation culture within product development in a South African telecommunications organization.

3.5 Possible limitations and challenges of the study

- The research design is cross-sectional and will only observe findings at a single point in time of the organization. There might be cyclical or environmental factors that may influence the research findings.
- The research is conducted on two core functions within the business, namely product management and innovation management offices. There may be other functions that may have a contributory influence on the development of a product.
- The research only focuses on the perception of product managers and innovation managers. There may be other variables that affect the perceptions of product managers, such as product type, and experience.
- The research only focuses on four cultural dimensions. There are many more dimension and constructs that inform culture.

3.6 Quality Assurance

3.6.1 *Construct validity*

Construct validity in research refers to how well a research measurement instrument can measure the construct for which it is intended (Rossman & Rallis, 2017). The research seeks to measure the effect of innovation culture on product development. The research constructs defined will be based on existing and well-accepted constructs of both organizational culture and innovation culture defined by Dobni (2008) and Johansson Alm (2014), which measure the various dimensions of innovation culture. The constructs will form the basis of the questionnaire that be used for the interview.

3.6.2 *Internal validity*

Internal validity also referred to as causality, refers to the degree to which the research scales can measure the cause-and-effect relationship between the variables (Rossman & Rallis, 2017). The research seeks to measure the perceptions of innovation culture on product development in the organization. To

ensure high internal validity, a common interview guide will be created for the research questions that will be followed for all interviews. The questions in the interview guide are based on the accepted dimensions of culture. The influence of culture will be based on the lived experiences of the product managers who are the primary custodians of product development in the organization. Lived experiences will offer rich data for the dependent variable of the research.

To further increase the validity of the research multiple data collection methods were used, namely literature review and interviews. Multiple methods enhance the validity of the study.

3.6.3 *Reliability*

Reliability refers to the extent to which the research instrument can measure the respondent's responses in the same way (Rossman & Rallis, 2017). Reliability will be achieved through the use of a consistent interview guide; this will ensure that the same questions are asked to every respondent. In addition, the responses will be captured via recordings and transcribed. The transcriptions will be analysed using a common innovation culture framework.

To further increase the reliability of the research, the interviews included various groups of participants. This included groups from the innovation management office and the product management office, with participants being responsible for different portfolios.

3.7 Ethical considerations

Research ethical standards contribute to the credibility and validity of research (Malhotra et al., 2017). To ensure that high standards of ethics are observed, research processes and environment must respect the rights of participants and handle information responsibly. The research must be undertaken in an environment that supports this.

Consent will be obtained from the organization to conduct the research with clear disclosure of the type of information to be collected and ownership of the

information after the research has been published. Ethical clearance will be obtained from the university before proceeding with the research.

An environment will be created where the subjects are comfortable sharing their honest views of their experiences without fear of reprisal. This will be achieved by clear disclosures to the data subjects on the purpose of the research and the data capturing tools including how the information will be processed and who will have access to the information. The identity of each of the data subjects will be anonymized before the final publication of the research. During the interviews, any respondent who does not feel comfortable will be allowed to request the interview session to end.

3.8 Summary of chapter

To understand how organizations can build a culture that is enabling for open innovation, explorative, qualitative research was undertaken.

The method of data collection is primarily based on semi-structured interviews with 26 participants involved in the innovation and product development office at a market-leading telecommunications operator in South Africa. This research was supplemented with a comprehensive literature review on the theory base that informed the research subject, namely innovation, culture and product development.

To ensure consistency and generalizability of research, an interview guide was developed for interviews. All interviews were conducted and recorded with explicit consent from the research participants.

To derive meaningful insights, the data analysis strategy used primarily based on thematic and sentiment analysis in order better to understand the enablers of the complex subject of culture and develop insights to aid scholars and practitioners.

In addition, content analysis was conducted to ensure that trends and key factors could be identified and then analysed for meaning.

The following chapter provides a presentation of the research results.

CHAPTER 4. RESULTS OF STUDY

The chapter provides a summary and presentation of the research findings following data collection methods set out in Chapter 3.

The aim of the study is to understand how South African telecommunications operators can create organizational cultures that are enabling for open innovation within product development by investigating if there is an innovation culture that motivates the success of open innovation within their product development. It also investigates if there are recommendations for the industry that could improve the success of open innovation within their product development.

Data was collected through a comprehensive literature review and interviews conducted with the organization's innovation managers and the product managers who are the primary custodians of innovation management processes and product development within the organization.

4.1 Data analysis

The analysis of the findings' structural underpinnings was built on the literature review that was completed in Chapter 2. The type of research conducted was qualitative and exploratory in nature to gain an in-depth understanding of the subject. This included taking the steps below:

- Critical factors - Based on the literature review conducted in Chapter 2, interview questions were created and used to direct the interviews. This was done to make sure that the critical variables that affect the research topic were covered and applied consistently. Based on these important considerations, the results were then analysed.

- Themes - The interview questions were open-ended, allowing the participants to share detailed information based on their personal experiences with the topic. This rich data was analysed in order to identify themes and create the research findings and insights.

- The interview results were analysed using thematic and sentiment analysis techniques to identify the prevalent themes in the organization and gain a deeper understanding of the influencing cultural factors to open innovation in product development. This method enabled the researcher to be guided by a common structure when conducting interviews and allowed for a structured way to interpret and analyse the results.

4.2 Data Presentation

The data was analysed and presented according to the research aims, research questions and research propositions. The results are presented using tables, graphs, and respondent quotes. Findings 1- 4 were analysed and presented in line with the research propositions developed in Chapter 2. Aligning the research findings to the research propositions allows a structured way to interpret the results and respond to the research questions.

Table 7 below displays the relationship between the research propositions and the research findings:

Table 7: Research propositions and findings relationship

#	Proposition	Findings
1	Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations	***Values dimension*** **4.3.1** Shared beliefs by employees that are supportive of external collaborations (assessed by alignment and direction) **4.3.2** Organizational values that are supportive of external collaborations (assessed by espousal and direction)
2	Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable	**Orientation dimension** **4.3.3** Orientation toward the market (assessed by orientation towards the market) **4.3.4** Adaptability of internal processes (assessed by degree of adaptability and control)
3	Telecommunications organizations that practice open innovation have internal structures & processes that are enabling for innovation and external collaborations	**Infrastructure dimension** **4.3.5** Innovation management in product development (assessed by innovation management processes) **4.3.6** Collaboration structures in product development (assessed by collaboration processes and structures)
4	Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation.	**Implementation dimension** **4.3.7** Sources of ideas in product development (assessed by the source of ideas) **4.3.8** Partnerships in product development (assessed by the type and role of partners in product development)

4.3 Results

4.3.1 Shared beliefs by employees that are supportive of external collaborations

To test for the relative importance of the values cultural dimension that is impactful for open innovation, the underlying individual beliefs were assessed for (i) alignment and (ii) direction. Participants were asked to share their beliefs regarding external collaborations. Open-ended questions were used to identify these beliefs. The results indicated that the beliefs were largely aligned, and that the direction was positive toward external collaborations.

(i) Alignment of beliefs

To determine the alignment of underlying beliefs, participants were asked to share their beliefs regarding external collaborations in product development. The participants' views were statistically analysed to determine the degree of alignment in the underlying beliefs toward external collaborations in order to understand the prevalent belief system that informs organization's culture. The alignment was categorized under positive beliefs and negative beliefs and measured by the number of participants who held such views. This indicated the level of consensus and alignment within the organization.

The results indicated that amongst the participants, there was a strong alignment of the beliefs toward external collaborations in product development. 60% of the participants held largely positive views toward external collaborations, citing the advantages of collaborating with external parties in product development, whilst only 40% of the participants held negative views toward external collaborations citing the disadvantages. Refer to Table 8 below.

Table 8: Alignment of beliefs

Direction of beliefs	Proportion
Positives beliefs towards external collaborations in product development (advantageous)	60% (21)
Negative beliefs towards external collaboration in product development (Disadvantageous)	40% (14)

A participant indicated that:

> *I think we are living in a world where if we don't partner, we will be left behind. Technology just happens was too fast to do it on your own* - Participant 2

(ii) Direction of beliefs

To determine the direction of underlying beliefs i.e., is the direction of beliefs negative or positive and what are the contributing reasons, participants were asked to share their beliefs regarding external collaborations in product development. The participants' views were analysed to determine the direction and the reasons.

The directions were categorized as *advantages towards external collaborations (positive direction)* and *disadvantages towards external collaborations (negative direction).* The reasons espoused were determined and depicted in a topology map. Refer to Figure 8 below.

Advantages towards external collaborations (positive direction)

Most of the participants (60%;21) held views that there were significant advantages gained from collaborating with external parties. They believed that external collaborations held advantages that included increased product innovation, capacity enhancement, risk transfer, and skills transfer into the organization. The below image depicts a topology of the advantages indicated by the participants that are associated with external collaboration in product development.

Figure 8: Topology of advantages of external collaborations

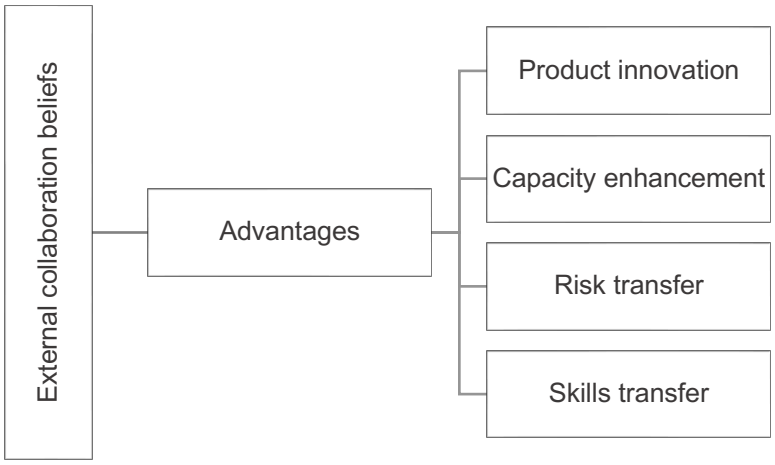
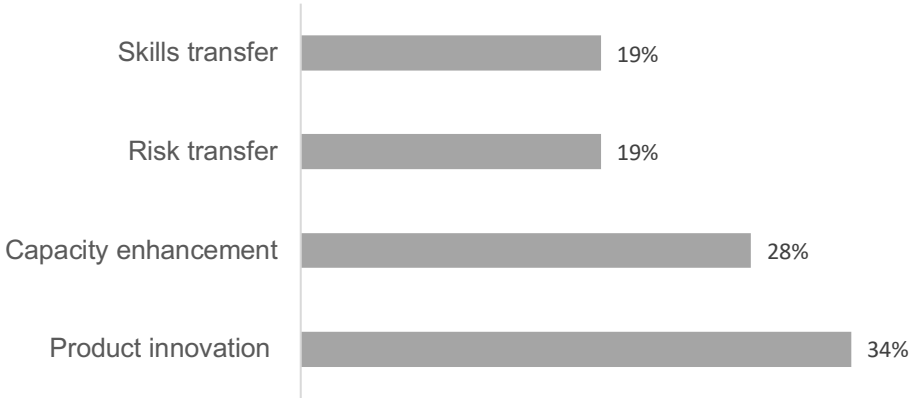


Figure 9 below depicts the reasons attributed by the participants as advantages associated with external collaboration in product development weighted and ranked.

Figure 9: Contributing reasons for advantages weighted and ranked.



Participants highlighted that the biggest benefit was the ***enhancement of product innovations*** due to the novelty and diversity of ideas brought by external parties. They believed that the external perspective was a positive aspect of the collaborations as it compensated for their internal organizational biases. Another strong theme was the ability to co-create with external communities and then leverage digital platforms to vote and build based on the largest demand. Participants described this by stating that:

it's a way to get new ideas. Remember we don't have time and the capacity to see what is happening – Participant 8.

It's great because it brings an external perspective. We see that co-creation with communities and customers makes a big difference as customers talk about what they want and want, they vote and then we build - Participant 10.

A number of participants highlighted that the executives and senior managers who played a large role in determining product roadmaps did not always have the capacity to connect with the market and identify new trends. They attributed this to factors such as the distance between the managers and the base pre-paid base who formed the majority of customers; the biographical differences between managers and customers which made it hard to relate to the different segments; and the geographic distance between vendors, competitors, and customers which made it difficult to gain local context. As a result, they believed external collaborations would help overcome these constraints and enhance innovation.

Participants also indicated that an additional benefit derived from the external collaboration was in ***alleviating internal capacity constraints*** in product development. The participants stated that internally they were always struggling to get technical capacity and support from the shared resource pools, noting that resources within the organization were allocated based on revenue generation potential supported by various management approvals. By collaborating externally, they were able to bypass these internal constraints and deliver products far quicker than internally. Another benefit of external collaboration they felt is ***risk transfer.*** Describing a willingness of partners to take on more risks than the organization was willing to take on. This included thinking out of the box, trying out unconventional ideas, and making quicker decisions without bureaucracy and investing without a fully validated business case. A participant described this by stating that:

They take risks that the organization is not willing to, so it's like outsourcing risk and you must know external parties always appreciate the upside of the risk i.e., opportunity because of the scale of our business – Participant 22.

Participants also indicated further benefits that merged strongly were the ***transfer of skills*** and culture transfer into the organization. Participants felt that external introduced them to new ways of doing things and this often improved the organizations' knowledge base and changed the way they approached things.

Disadvantages towards external collaborations (negative direction)

A minority of the participants (40%;14) held strong beliefs that there were disadvantages in collaborating with external parties in product development, including sourcing ideas and co-creating products. Figure 10 below depicts a topology of the disadvantages of external collaborations.

Figure 10: Topology of disadvantages of external collaborations

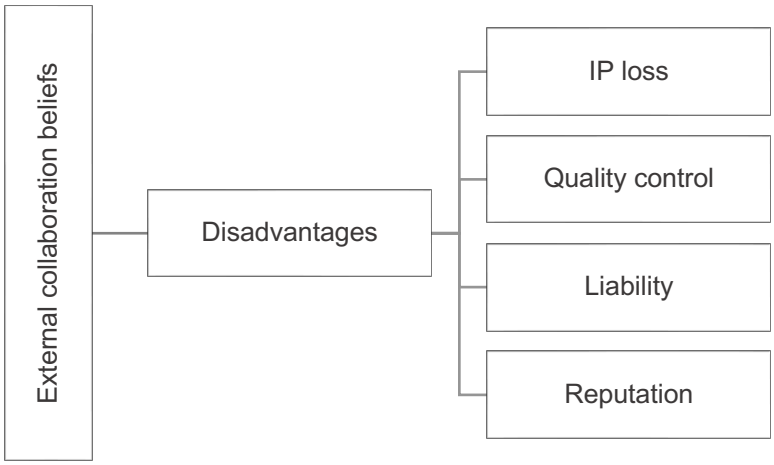
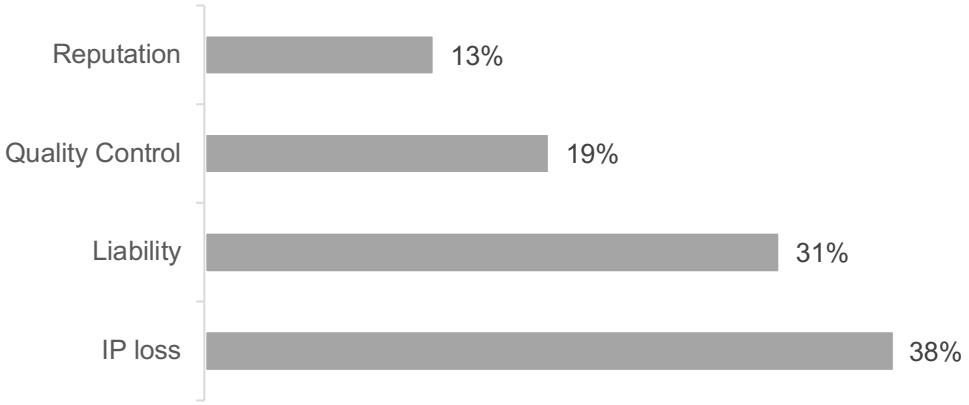


Figure 11 below depicts the reasons attributed by the participants as disadvantages associated with external collaboration in product development weighted and ranked.

Figure 11: Contributing reasons for disadvantages weighted and ranked.



Participants who dominantly held this view highlighted that the **loss of Intellectual Property (IP)** was the biggest disadvantage as this would erode their competitive advantages. They stated that there was a constant risk of internal ideas leaking to competitors and being taken to market before they could. Participants stated that because of the size of the organization and the nature of the products, external parties always got exposed to a vast amount of intellectual property which also included customer information. They stated that because of the nature of the industry, it was difficult to avoid this because there was a lot of cross-pollination. This meant that external parties often also serviced competing operators and as a result IP would make its way to competitors and, in some cases, be used by external parties for their own endeavors. A participant described this by stating that:

> *You can partner with someone who supports you and also your competitor and before you know it… your product is launched by a competitor* - Participant 15.

A further dimension of the IP risk highlighted was the high number of ***legal IP claims*** levied against the organization by external parties through the various open innovation programs. The participants indicated that this was where they found that the majority of the ideas that external parties pitched were already available internally and were already being developed, in a backlog, or parked due to prevailing market conditions. However, due to the organizational silos and lack of internal insights, it was often discovered too late that ideas, and solutions were not 'new' resulting in legal claims, and considerable resources spent in

defense. Similarly, participants in the innovation noted it they were always concerned about the ***legal liability*** of developing others that were already legally protected by someone else as it was difficult to vet all idea patents and trademarks. They indicated that external parties did not always have the capability to do it themselves, especially small businesses or individual parties such as students or the general public. Others would be deliberately dishonest. Participants said:

> *People can take other people's ideas and present them as their own* - Participant 5.

> *At some point, we were dealing with multiple concurrent cases from people accusing us of stealing their IP. That ended up costing us a lot of time and money to deal with* – Participant 1.

Table 9 below summarizes the IP concerns cited by the participants:

Table 9: Summary of IP concerns

#	Direction of beliefs
1	Loss of product information, resulting in competitors launching first
2	Loss of customer information, resulting in migration of customers
3	Infringement of Intellectual property rights through the development of products from external party
4	Legal dispute over ownership and revenues of IP collaboratively developed
5	Usage of IP that is not sound or credible

Another disadvantage cited were the challenges associated with managing the **quality of services** from external parties. Participants stated that customers would be exposed to poor quality services because they were not in control of the idea, or services. In the event that these were service failures, they stated that it would cost them as the legislative framework still placed responsibility on them to ensure governance adequacy and assurance when working with third parties. The view was that this risk materializing would have a negative ***reputation impact*** on the brand and based on this, they felt they felt that it was better to build

internally and better control the quality and minimize liability. A participant described this as:

> *The challenge for us is that whoever we partner with, the law will still hold us accountable even if something goes wrong. Especially on the public sector contracts the penalties are very heavy* – Participant 13.

4.3.2 Organizational values that are supportive of external collaborations

To test for the relative importance of the values cultural dimension that is impactful for open innovation, the organization values that are espoused (endorsed and visibly communicated) were analysed for their direction toward external collaboration in developing products. The attributes considered included policies, communications by the leaders, organization strategies and visible activities geared towards collaborating with external parties in developing products. The direction was categorized as *advantages towards external collaborations (positive direction)* or *disadvantages towards external collaborations (negative direction).* The results indicated that:

- The organization's CEO (leadership) frequently communicated the value of partnership in accelerating innovation and strategy.
- A program existed to source ideas and innovations from external parties (intention, structure).
- The organization had an external partnership innovation policy (process).
- The organization facilitated challenged based innovations programs with SMEs (implementation).
- The organization facilitated hackathons with universities (implementation).
- The organization invited external parties into their innovation initiatives within the organization and partnered in the development and communication (implementation).
- Co-branding with external parties was visible in the organization innovation programs (communication).
- A dedicated partnerships team was in place to support partnerships (new financial product business unit (structure).

The results showed that it was evident that the organization's visible espoused values were supportive of external partnerships in the development of products. The direction of the results was *advantages towards external collaborations (positive direction).* This was indicated by the existence of leadership

endorsement, programs to support partnerships, and collaboration with external partnerships on projects demonstrating the success of external partnerships.

A participant quoted one of the leaders saying:

> *Our big boss is always telling us, why must we build it ourselves if we can get someone else to pay for it or use what someone else has built. Don't reinvent the wheel* – Participant 9.

4.3.3 Orientation toward the market

To test the relative importance of the orientation cultural dimension that is impactful for open innovation, the innovation market orientation was assessed for focus. Participants were asked to share their perspectives on the drivers of innovation in product development. Open-ended questions were used to identify the orientation. The participants' views were analyzed to determine what the drivers of innovation were. These were then categorized as *internally focused,* or *market focused.*

The results revealed that the organizations' orientation is primarily externally focused with a significant emphasis on market competition and customers. The most significant drivers of innovation identified were competition, financial pressures, and customer demands. Figure 12 below depicts a topology of the drivers of product innovation.

Figure 12: Topology of the drivers' product innovation

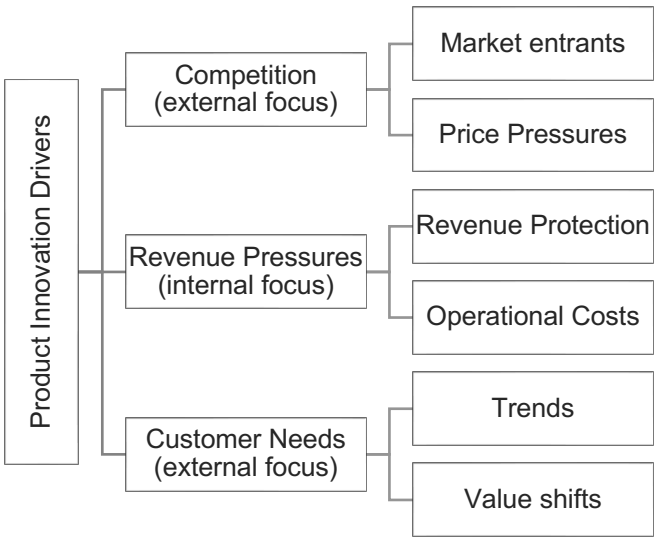
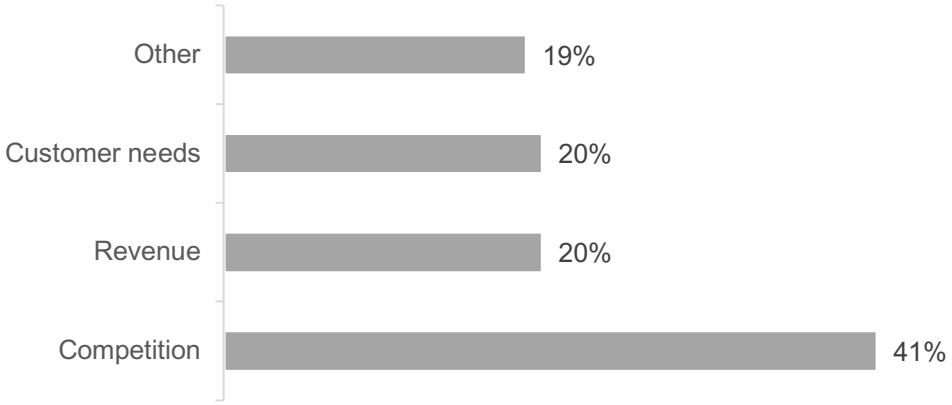


Table 10 below depicts the drivers for product innovation cited by the participants. The results indicate that 61% (27) are externally oriented, whilst 39% (17) are internally oriented.

Table 10: Drivers of innovation in product development weighted and ranked.



The majority of the participants (41%;18) identified **competition** as the biggest driver of product innovation. The participants indicated that competition in the industry had increased significantly, being that the market was saturated. They believed that there was an increasing number of new smaller **entrants** operating as Mobile Virtual Network Operators (MVNO). These new players which were traditionally not in the telecommunications space, included big retail groups and financial services providers now offering telecommunications services and increasing competition. The participants highlighted that the new entrants were copying their services or offering similar services with slight variations and, in some cases, slight improvements and cheaper prices in order to attract customers as they could cross-subsidize their costs with other services they offered. A participant described this as:

> *It's all OTT players and 10x players… because Technology is increasing people's ability to compete with us* – Participant 16.

The participants further indicated that increasing competitors were offering aggressive pricing resulting in **price pressures** that sometimes created price wars. To ease the pressure on topline prices, the organization was forced to innovate in order to enhance customer value and retain customers. A participant described this as:

> *Our largest customer base is prepaid and there is no loyalty in that space. They will go to where the pricing is lowest, so you are forced to respond to your competitor's price points* – Participant 15.

The majority of the participants indicated that market position and being considered the best was a key driver for why they innovated.

The second highest driver for innovation identified was **revenue pressures**. 20% (9) of the participants indicated that revenue pressures were driving the need to innovate in order to increase revenues for the organization. A larger number of participants indicated that the traditional revenue streams of telecommunications services from services such as voice and data were gradually declining due to substitute services such as Instant Messaging (IM) and Voice over Internet Protocol (VoIP) which were cheaper and more accessible and were increasing in quality.

There was a strong common sentiment across most of the participants that there was an existential threat to the business and so it was imperative that the organization innovate and find the next new core revenue generator. Participants also indicated that increasing **operational costs** were putting pressure on the bottom line. They described how the current poor macroeconomic conditions were weakening customer spending, and how the energy crisis and the global geopolitical tensions were increasing operational costs. In response, there was increasing pressure to keep costs as low as possible and do more with less. As a result, participants indicated that they constantly look to new and innovative ways to increase revenues whilst managing the decline of traditional revenue streams and simultaneously lower costs. A participant described this as

> *We need to come up with innovative ways to protect and keep our revenues but remember that as a market leader, you can't be rash because of the impact on your bottom line* – Participant 15.

The third highest driver identified for innovation was **customer demands**. 20% (9) of the participants indicated that customer needs were driving the need to innovate. The participants highlighted that global technological **trends** and dynamic competition were increasing customer demands. They described how the world was technologies like the internet was making customers more informed and therefore demanding. They indicated that the more informed customers were requesting similar offerings locally. A participant described this by saying:

> *We see trends and ideas coming from the West or Asia… and then what you see is customers' needs changing rapidly in line with those trends* – Participant 8.

Several participants highlighted that as a market leader, customers always expected them to have the best and latest products and that failure to do so would tarnish the organization's reputation, which means that the company constantly had to be at the forefront of innovation. Participants also highlighted that **value shifts** were also a driver of innovation. They described how the economic conditions had gradually changed the customers' perceptions of value and that some services that were previously consumed were now considered luxury goods and customers forgoing these in favor of more basic services. As a result, there was pressure to deliver higher levels of value at lower price points and leverage innovation to do this. A participant described this by saying:

> *Economic shifts are changing customers' choices. Financial pressures on customers are causing them to prioritize basic needs over luxuries* – Participant 5.

The general sentiment was that customer needs were a big determinant for innovation in products. Innovation was informed by solutions customers wanted, elimination of pain points, or increasing total value for customers through superior product offerings.

Additional drivers identified included a strong focus on realizing the organization's purpose which was linked to making a positive impact in the lives of society through technology and innovation.

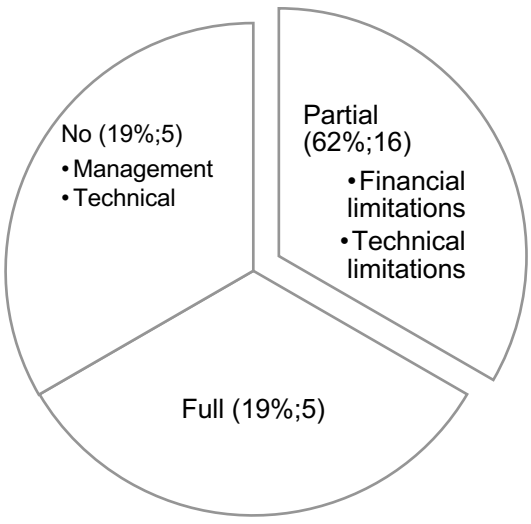
4.3.4 Adaptability of internal processes

To test the relative importance of the orientation cultural dimension that is impactful for open innovation, the adaptability of the product development process was assessed for flexibility. Participants were asked to share their perspectives on flexibility and autonomy within product development. Open-ended questions were used to identify the adaptability. The participants' views were analysed to determine what the drivers of innovation were. The results were then further analysed to determine the contributing factors that hinder or enable adaptability. The categories were then categorized as:

- ***Yes*** *(the process is adaptable, there is flexibility, and I have autonomy).*
- ***No*** *(the process is not adaptable, it is inflexible, and I have no autonomy.)*
- ***Partial*** *(there is a moderate degree of adaptability and flexibility, I have a degree of autonomy).*

The findings reveal that the organizations' adaptability is largely flexible with a bias for control (stability) where decisions have a financial impact. Whilst employees are given autonomy and freedom to make decisions, this is limited when there is a financial and significant technological impact. Figure 13 below depicts the degree of autonomy and control in product innovation.

Figure 13: Degree of autonomy and flexibility



Whilst in general participants believed that they had a degree of flexibility in product development that enabled them to make decisions, only a small percentage of 19% (5) believed that they had **full autonomy and flexibility (control)** in the process. This small percentage believed they were empowered and capacitated to make all decisions regarding their products' trajectory including features, functionality, pricing, and choice of partnerships. The small group cited that they had strong leadership support who believed in them and supported the decisions that they made. The majority of the participants (62%;16) felt, however, that while they have a degree of autonomy and flexibility it was limited when decisions had an impact on revenues. A participant indicated:

> *Yes… but up until things start to affect the bottom line. Especially if it is products that will cannibalize the current revenue streams* – Participant 19.

Another factor that prevents flexibility was **technical capacity.** The participants indicated that as a technology organization, all enhancements and developments required technical resources to develop. They felt that there was often no appetite to explore complex or non-standard requirements. They cited that effort would be weighed against the immediacy and size of returns and often this disempowered the product teams. A participant indicated that:

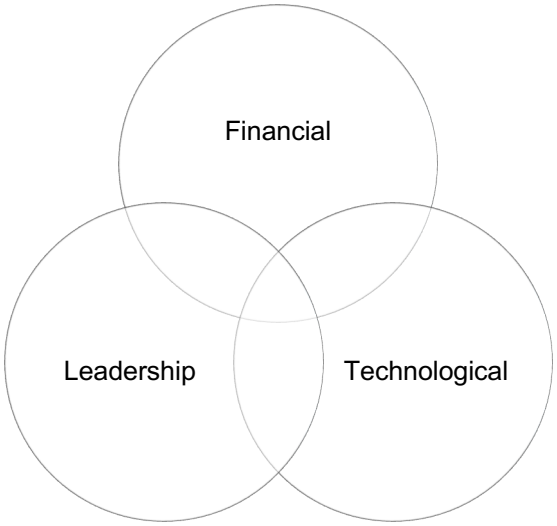
> It's *dependent on capacity and resources; whatever we want is evaluated by management and they look at revenue and then we get deprioritized. It ends up just being very demoralizing* – Participant 18.

The impact of staff morale was a strong sentiment amongst the participants, especially those who developed highly specialized products or supported niche customers who were not the organization's large primary consumer base. The second minority group (19%; 5) of participants who indicated an inflexibility and a lack of autonomy within product development attributed this to leaders whom they described as dictatorial and too involved in operational activities. In addition, they indicated that 'old' inflexible systems managed by 'old and inflexible people' hampered innovation.

An analysis of the results indicates that the biggest factors that influence the level of adaptability and flexibility of the product development process are the

leadership and the degree of autonomy they permit; the technology platform and the ease with which they can be adapted and configured to suit the requirements; and the financial impact of products including costs and profit potential. Figure 14 below depicts the relationship between these three key factors.

Figure 14: Key factors that influence adaptability.



4.3.5 Innovation management in product development

To test the relative importance of the infrastructure cultural dimension, which is impactful for open innovation, the innovation management process within product development was assessed. Participants were asked to share their perspectives on how innovation was managed within product development. Open-ended questions were used to test for the existence and integration of structures and processes. The results were analysed to determine if there are existing integrated processes or if there are no existing integrated processes. Table 11 below indicates the innovation management processes in product development.

Table 11: Integrated product innovation processes

Product development innovation management processes	Proportion
Yes, there are existing integrated processes (have developed internal processes)	0% (0)
No, there are no existing integrated processes (rely on central function)	100% (23)

All participants (100%) indicated that they relied on structure and processes defined by the innovation management office to drive innovation within their functions. This included the program established by the innovation office to promote and drive initiatives both inside and outside to source ideas and to find partnerships. The program included coordinating the projects, create events like hackathons, and challenge-based competitions etc. Participants indicated that they relied on the innovation office to filter innovations and to channel these to the product management office. Some participants indicated that whilst they knew of the function and work it did, at times, they did not feel that there was adequate inclusion to the product development teams to filter ideas and feedback. A number of the participants indicated that at times the program felt inhuman: lacking the human touch once ideas where submitted.

None of the participants indicated having any performance metrics associated with innovation. Participants indicated that:

> *It's the team on the other side. We wait for them to send stuff to us, but I wouldn't say that's frequent in my opinion* – Participant 7.

> *That process is like a black box. I mean you send something though and all you get is an automated mail. No human touch from anyone just a machine* – Participant 12.

Additional activities managed by the innovation office included creating awareness for innovation, creating trainings for innovation, and managing the innovation champions program across the organization.

4.3.6 Collaboration structures in product development

To test the relative importance of the infrastructure cultural dimension, which is impactful for open innovation, the organization's collaboration structures in product development were assessed for adaptability to external collaborations. Open-ended questions were used to test for existence processes to support external part collaborations. The results were categorized as:

- **Standard organizational partnering processes** - These are standard business-as-usual processes that are traditionally used to manage closed innovation processes.
- **Specialized, optimized partnering processes** – These are optimized processes to facilitate open innovation processes or external collaborations.

The findings revealed that the organization applies the same 'standard processes' to partner external parties regardless of type of engagement. Table 12 below indicates the degree applicability of partnership processes across in product development.

Table 12: Partnering processes in product development.

Partnering processes	Applicability
Standard organizational partnering processes	83% (19)
Specialized, optimized partnering processes	*17% (4)*

Whilst all participants indicated that they followed the standard organizational processes to identify and collaborate with external parties, 83% (19) followed the 'as is' processes without adaptation. The standard processes were leveraged for open innovation initiatives where the organization extended its internal innovation processes to various external actors to source ideas, co-create, and develop products with the organization. Standard processes were coordinated among the shared services central supply chain management (SCM) teams who sent out

invitations to partners, compared responses, conducted due diligence on partners and on-boarded partners. This process was supported by various assurance functions such as legal, compliance. All product innovations were also accordingly required to under similar rigorous due diligence processes.

Participants indicated that a large amount of time had to be spent in navigating the onerous processes and that the processes often resulted in delays to projects. Other participants indicated that most of the smaller parties or individuals struggled to navigate these processes. Participants indicated that at times they would find themselves engaging and building services despite lack of due diligence or contractual agreements in order to expedite their projects, even though they knew this was a big risk to the organization. Participants described this as:

> *We follow full SCM, we don't have a choice. We sit with multiple parties in the organization to get a vendor through is not easy* – Participant 12.

> *The current onboarding processes are not adaptable and not fit for purpose so as our business grows the processes must evolve* – Participant 22.

> *We use our existing processes…see the digital business coupled with the telecoms way of work which doesn't always work for it. Tech partnerships in the digital business are nimble and can move quickly so Telco way of work doesn't work* – Participant 10.

Only a minority of the respondents (17%; 4)) indicated that they had a specialized processes to assist them in partnering more effectively. These participants were part of the 'stand-alone division' that was established as an accelerator unit. They indicated that because they relied heavily on external partnership, they had a dedicated sub-partnership team that built customized partnership processes and framework that could be customized to rapidly fit different engagements at different stages e.g. various partnering models, legal agreements.

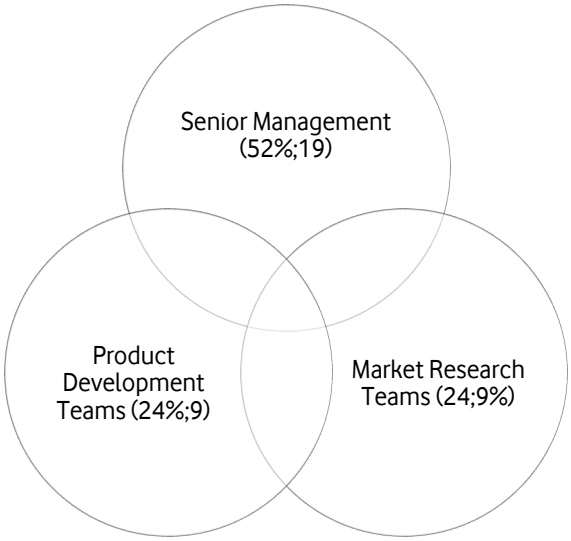
4.3.7 Sources of ideas in product development

To test the relative importance of the implementation of cultural dimension the innovation of which is impactful for open innovation, the product ideation sourcing processes was assessed for relation type and value creation. Participants were asked to share their perspectives on where the ideas for products developed were sourced from and how innovation was managed within product development. Open-ended questions were used to identify the sources. The results were categorized into groups of that that shared a similar profile.

The results indicated that the most prevalent source of product innovation ideas was the organization's senior management team, market research teams, and product teams.

Figure 15 below depicts the most significant sources of product ideas, and concepts defining the final products.

Figure 15: Sources of ideation



The majority of the participants indicated that **senior management** and senior leaders were the biggest sources of product ideas and product roadmaps. The participants indicated that management and senior leadership determined the organization's products by observing global trends, the competition, vendors, and also what the other operators in the group have developed. Based on the

information they would then select the most appropriate ideas at a high level to be developed within the organization and filter these to the product teams.

A key determinant that emerged was the profit potential of the idea was critical. Ideas that were believed to be most profitable would then be developed or enhanced. Participants described a very strong top-down culture informing ideation in the organization describing how ideas from managers, especially the top executive committee members were instantly prioritized without question or rigor applied to vet the ideas. This also included the partnerships that the product should consider engaging in.

The second largest source of product ideas or roadmaps was the organization's **market research teams**. These were teams that were responsible for analysing the market through various means, such as customer focus groups, competitor analysis, and customer feedback. The teams would on a frequent basis, engage the product teams to share insights on market activity supplemented by data. Based on the insights, the teams would develop products and services. Some teams expressed frustration on the constant requirements to perform competitor market research, stating that the 'obsession' with the market sometimes stifled innovation as there could not think outside of what their competitors were doing 'inquire' on competitors were doing. A participant described this by saying,

> *Everything is led by competitor analysis. It prevents us from being innovative because we are just trying to mimic and outdo the competition* – Participant 20.

The participants also indicated that there was a big drive to use big data techniques to analyse market and customer trends to make decisions and innovate.

The third prominent source of product ideas was the **product management** office which included product managers, product owners and portfolio owners. These teams were the primary custodians of developing products including selecting ideas and transforming these into products that meet customer needs. The participants indicated that they consolidated information from all groups of people and would define roadmaps based on the strategy of the business unit and strategic goals set by the senior leadership team. A large part of their

responsibility was to manage the entire lifecycle of the product, so a lot of the ideation was informed by data they observed on product performance once launched in the market and they would then use this as input for new product innovations.

The findings identified that all three groups were strongly influenced by the **technology vendors**. Participants indicated that vendors of technology platforms and solution providers would inform them of new capabilities they could offer that they believed the operators might find of value. Based on these, the product development teams would then identify commercial opportunities and define products around the capabilities.

4.3.8 Partnerships in product development

To test the relative importance of the implementation cultural dimension, which innovation is impactful for open innovation, the partnerships in product development were assessed. Participants were asked to share their perspectives on the types and role of partnerships in product development. Open-ended questions were used to identify the partnerships. The results were categorized by partnership type and role.

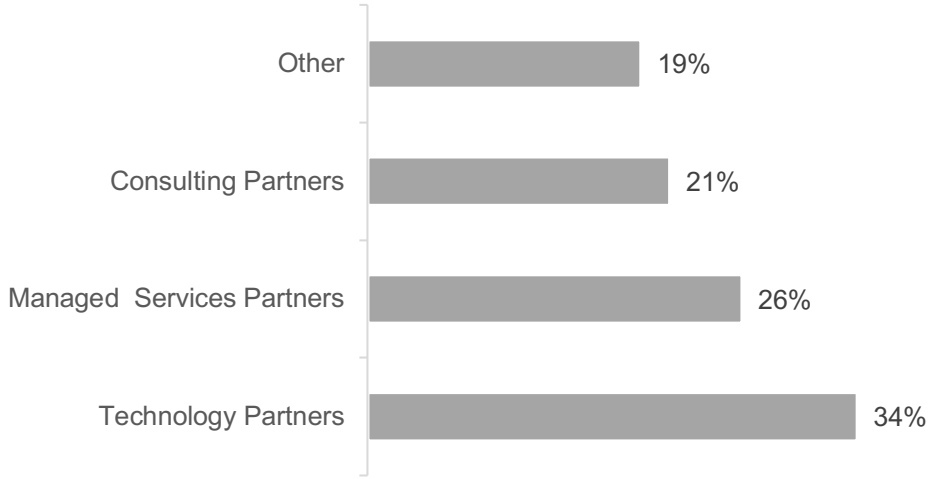
The results indicated that the majority of external partnerships in product development as a source of ideas, to co-create and develop products with the organization were with technology partners, managed service providers, and consultants. Table 13 below shows the prominent external collaborations.

Table 13: Product development external collaborations

Rank	Partner type	Role and services providers
1	Technology partners	• Technology providers (HW & SW) • Software development • Infrastructure maintenance
2	Managed service providers	• Customer service and support • Product administration • Product marketing and sales Technology
3	Consultants	• Market research • Process optimization • Design and Implementation • Assurance services

Figure 16 below depicts the external partnerships in product development by type and are weighted and ranked.

Figure 16: External partners in product development



Participants indicated that the majority of the external partnerships and collaborations relating to product innovation and development were with three types of groups namely technology partners, managed service providers, and consultants. The first group, **technology partners** (34%;13), were identified as the most critical as they provided the infrastructure on which the products were developed. Technology providers were identified as frequently setting the innovation direction for the organization and also providing the organization with the areas of technologies that might be exploited for commercialization. As the majority of the technology partners had an international presence across multiple markets, participants indicated that this was beneficial to them as they were able to filter insights and trends from more developed markets in the world and bring them to South Africa. Technology partners had a lot of influence on the senior leaders in the organization who were identified to have the biggest input into products and services.

The second group identified was **managed services partners** (26%;9). These collaborations provided services on behalf of the organization and included selling, supporting, marketing, and administration of products and services on behalf of the organization. Managed services partner collaboration was identified

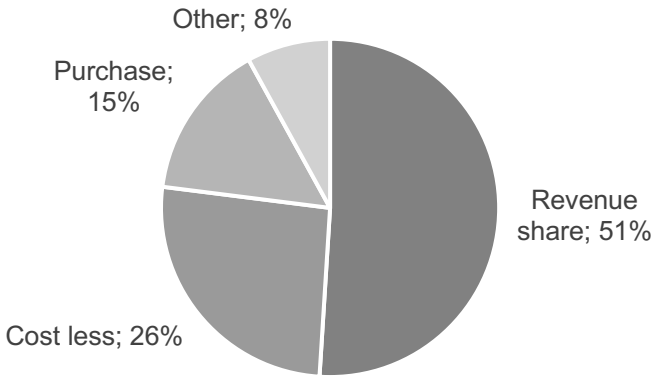
to have a big influence on innovation as they were largely in contact with customers and as a result, they would provide the organization with ideas on potential product innovations. In some cases, managed service providers would co-create services with the organization or create and sell to the organization that would be sold to the end customers as the telecommunications operators own services. Such strategies would leverage different business models, but mainly as a service with various revenue share.

The third largest group identified was **consultants** (21%;8). These collaborations included consultations with the organization to explore new areas where the business had little expertise or capacity. Consulting collaborations were leveraged in assisting the organization with the design of certain products and services and managing new initiatives or providing independent assurance on the organization's products. The participants indicated that these collaborations were key for acquiring intellectual property and managing new exploratory endeavors that businesses undertook.

Business models

A further analysis was undertaken with the partnerships to understand the business models that leveraged to go to market and realize value. The results indicated that the majority of external partnerships 51% (19) adopted traditional business models largely revenue share and cost less with the organization providing mainly the services under its control and channels. Refer to Figure 17 below.

Figure 17: Type of business models



Participants indicated that the business models that were adopted in collaboration with external parties were traditional business models that were primarily inside out, such as outright purchases of services, co-sponsoring development, and sharing revenue, and also costs minus models for achieving targets. The participants indicated that these models were not always geared for long term sustainability as the organization had a preference of paying upfront risk through capital provision and then recouping from the upside in higher revenue shares. The model also tipped power in favor of the operator as the capital provider. A participant described this as:

> *We like are bullish in our agreements. We use rev shares a lot but because we foot the bill up front, we get a bigger chunk. In the long run its not sustainable* – Participant 20.

4.4 Summary of results

The findings demonstrate the relative importance of the innovation culture dimension and how they impact open innovation product development in telecommunications in South Africa. Below is a summary of the results in line with the propositions.

Proposition 1. Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations

The results found that there is a clear and strong presence of shared beliefs within the organisation towards external collaboration. This was indicated by a high percentage (60%;21) of participants who shared the same beliefs with a high degree of alignment in their views (1/5).

The results found that the beliefs by employees are largely supportive of external collaborations (60%) with the biggest reasons cited, in ranked order as, 1 – increasing product innovation through the diversity of ideas, 2 - alleviating capacity constraints though access to wider pool of resources, 3 – Transferring risk to external parties that the organisation does not have an appetite for, 4 – acquiring new knowledge and skills from external parties.

The portion of the population (40%;14) that did not support external collaboration cited the biggest reasons in ranked order as, 1- strong fear of loss of IP believing it may weaken competitive position, 2- concerns of liabilities associated with breach of contractual obligations and usage of IP, 3 – the inability to manage quality of services from external parties, and 4 – negative reputation impacts and brand association from failure to deliver on stake holder expectations.

The results also found that the organisations values were supportive toward external collaborations. This was demonstrated by advocacy by the leaders, programs design to seek out external partnerships and ideas, external ideas polices and frequent communication on success of partnerships

In conclusion, the results indicate a strong shared support for external collaboration by employees, supported by similar organizational values, however there is a strong underlying fear of sharing information and collaborating.

Proposition 2. Telecommunications organizations that practice open innovation have an orientation toward the market and adaptable internal practices

The results revealed that the organizations' orientation is primarily external. The primary focus of product innovation was competition (41%;18) and customers (20%;9). Internal drivers were revenue protection and other factors such as operational efficiencies and cost savings. The results indicated that participants were at times concerned about the focus on competitors, citing that it was overbearing and at times limited innovation.

The results found that the majority of the participants (62%;16) believed that the internal processes where moderately flexible and allowed for autonomy with the biggest limitations being decisions that had revenue impact or were technically complex. A small portion of participants (19%;5) believed that processes were very flexible with high degree of autonomy cited supporting leadership and the biggest enabler. The remaining population (19%;5) that indicated no flexibility and no control cited autocratic leadership and rigid technological platforms as a reason.

In conclusion, the results indicate that there is a strong market orientation. The organisation is aware of its market and leverages that information to make decision, however at times the focus on competition was excessive. In addition, there is a moderate degree of adaptability. The internal processes have a degree of flexibility, but the organization exercises high control when it comes to revenue impacting and technically complex product innovations.

Proposition 3: Telecommunications organizations that practice open innovation have internal structures and processes that are enabling for innovation and external collaborations.

The results indicated that the organization had a centralized function that was responsible for managing and coordinating all innovation in the organization. All participants (100%;23) indicated that this is the processed that they relied on, however they felt that it was not adequately integrated into the product development process. As result there was a high volume of ideas but a low output of development from the process.

The results further indicated that majority (83%;19) the external collaborations in the organizations were managed using the business as usual processed that are designed for internal innovations. Participants indicated that these processes onerous, ineffective and not agile enough to suit the dynamism of external collaborations. In addition, that these created a bias for small actors. A small percentage (17%;4) indicated that they collaborated with external parties using processes that were enhanced to meet these needs. This enabled them to partner with digital companies better, to apply different business models and to move quicker. Participants indicated that the existing processes were not effective for new types of business or ideas (edge innovation) but designed for the core products.

The results also indicated that although there was a central innovation management function that all the product development team were aware of, this function was not adequately integrated into product development process.

In conclusion, the results indicate an innovation management structure in the organization that is leveraged by all participants, however, is not well integrated into product development. The existing processes for collaboration with external parties are not efficient for external collaboration and new innovations in product development.

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Proposition 4. Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation.

The results indicated that the majority of the product ideas for product development were from the senior management (52%;19), followed by product market research teams (24%;9) and product development teams (24%;9). However, the biggest influence in all group were technology vendors who frequently showcased capabilities to leaders and customers who indicated needs for products. These two external groups influenced all three internal groups in product development.

The research also found that the product development process involved a number of external parties, however these were concentrated on technology partners (34%;13), managed services partners (26%;9), and consulting partners (21%;8). These parties assisted in proving ideas, developing concepts, and developing products and services. The results indicated that technology partners had the biggest influence of product roadmaps. Additionally, there was a small existence of other external parties (19%;7) such as communities, small to medium businesses, education institutions etc.

In conclusion, external parties were leveraged in the development of products, however there was a strong dominance of technology partners in the process. The network was not diverse enough.

CHAPTER 5. DISCUSSIONS OF FINDINGS

This chapter discusses the findings from the study summarised and presented in the previous Chapter 4. The aim of this chapter is to interpret the research findings and derive meaningful insights with the aim of understanding *how South African telecommunications operators can create organizational cultures are enabling for open innovation within their product development* by investigating if there is an innovation culture that motivates the success of open innovation within their product development; and investigating if there are recommendations for the industry that could improve the success of open innovation within product development.

To support the research aims, a literature review was conducted to understand the existing body of literature and identify critical constructs that influence the research subjects. Based on the literature review, four propositions were developed that would assist in answering the research question.

The discussions in this chapter are framed around each of the research propositions and then assessed against the research question. Aligning the discussions to the research propositions and the research questions allows a structured way of responding to the research questions and achieving the research aims.

Based on the research findings, each proposition is tested against the research question, based on the approach below:

1. A discussion on the existence of each culture dimension based on the research proposition (research question 1).
    a. Rating on existence of dimension.
    b. Each proposition is then **accepted or rejected.**

2. A discussion on the importance of each cultural dimension based on the current implementations impact to external collaborations (research question 2).
    a. Rating importance of dimension.

3. A discussion on recommendations for each cultural dimension (research question 3).
    a. Recommendations of dimension.

The chapter then provides a priority for each recommendation.

The section closes off with recommendations for future research.

Table 14 below highlights the layout of the discussions.

Table 14: Layout of discussions

Discussion	Proposition	Research Question 1	Research question 2	Research question 3
		Is there an existence of innovation culture dimensions that motivate the success of open innovation within South African telecommunications product development?	**What is the relative importance of the innovation culture dimensions within South African telecommunications product development?**	**Are there recommendations for the industry that could improve the success of open innovation within South African telecommunications product development?**
5.1	**Proposition 1: [values]** Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations	• Alignment of individual beliefs, • Direction of individual beliefs	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
5.2	**Proposition 2 [orientation]** Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable	• Market orientation of product development • Adaptability pf product development processes	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
5.3	**Proposition 3** [infrastructure]Telecommunications organizations that practice open innovation have internal structures & processes that are enabling for innovation and external collaborations.	• Innovation management processes in product development • Collaboration processes in product development	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*
5.4	**Proposition 4 [implementation context]** Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation	• Sources of ideas in product development • Types of partnerships in product development	*Based on the implementation, what is the impact of these cultural dimension on external collaborations?*	*Priority ranking and recommendations*

5.1 Discussion on values cultural dimension

Proposition 1: Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations.

5.1.1 *Introduction*

Organizational culture is a complex social phenomenon that is described as a 'collective programming of the mind' that distinguishes one group from another, ultimately shaping how that group of people behaves (Hofstede et al., 1991). Whilst the culture of an organization can be analysed by looking at its observable attributes such as its policies, public announcements, and other visible behavioural patterns 'artefacts,' it is informed by a system of values and underlying beliefs 'espoused values and assumptions' (Schein, 1992). It is these underlying beliefs that ultimately direct the actions taken by the members of an organization.

An organizational culture that is conducive to open innovation embraces openness and external flows of knowledge (Yun et al., 2020). The research study, therefore, sought to understand the organization's underlying values and beliefs towards external collaborations as a cultural dimension with an impact on open innovation in product development.

To better understand how South African telecommunications operators can create organizational cultures enabling them for open innovation within their product development. The research identified **values** as a key cultural dimension that had an influence on open innovation in product development. This dimension was found to have two contributing factors, namely individual beliefs and organizational values.

Based on the literature review, the first proposition developed *Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and*

organizational values that are supportive of external collaborations. To test the proposition the alignment and direction of beliefs and values was assessed.

5.1.2 *Existence of values cultural dimension (Research question 1)*

To determine the existence of individual beliefs that were supportive of external collaboration two things were assessed namely (i) alignment. This is the degree of alignment in the underlying beliefs in order to determine if there was common shared belief towards external collaborations categorised by the percentage of agreement between the groups, and then (ii) the direction of the beliefs. These are the sentiments held towards external collaborations, categorized as *advantages towards external collaborations (positive direction)* and *disadvantages towards external collaborations (negative direction).*

In order to determine if the existence of organizational that supported external collaborations, an assessment of the organization visible artefacts was similarly analysed. These were categorized as *advantages towards external collaborations (positive direction)* and *disadvantages towards external collaborations (negative direction).*

The results indicate a strong alignment in the underlying beliefs across all product development teams within the organization towards external collaborations with a 60/40 ratio with a majority aligned towards the positive belief. The high levels of uniformity are indicative of a 'collective' shared belief system informing the value within the organisation. This alignment underpins a strong culture within the organization in contrast to a stratified and fragmented belief system that would have been indicative of a weak culture.

The results also indicate a dominant belief system that is supportive of external collaborations espousing benefits towards enhancing product innovation. This was indicated by a large percentage of participants who were in favour of external collaborations. This belief system demonstrates an openness to external flows that is cited as a critical enabler for open innovation (Yun et al., 2020). Additionally, the advantages noted for the organization were congruent with those found by Bigliardi (2012), including the diversification of products, cost benefits

risk transfer and knowledge transfer, and as means to overcome resource constraints such as lack of knowledge, technologies, and skills (Bigliardi et al., 2012). These findings validate that telecommunications operators believe that external collaboration is a strategy that should be used to enhance product innovation.

Despite the dominant 'collective views' that endorse external collaborations, there was a group of participants that held views that were opposing to external collaborations in product development. The research revealed that the contrarian views were concerned primarily with the loss of the organization's intellectual property, which they believed would lead to erosion of the organization's competitive advantage. An in-depth analysis revealed that concerns included the loss of customer information, and product secrets, and the risk of legal claims by external parties for theft of intellectual property. There was little evidence amongst the participant of having experienced this, but this was a strong view.

The results demonstrate that within the telecommunications sectors there is still a view of intellectual property assets as a defensive tool for maintaining competitive advantage and managing risk of litigation (Chesbrough, 2015). These beliefs demonstrate a lack of understanding of intellectual property management within open innovation and strategies that can be leveraged to enhance value and create new revenue streams. (Chesbrough & Bogers, 2014; Davis & Harrison, 2002). The fear of loss of IP also indicates a lack of organizational psychological safety due to fear of the negative consequences associated with sharing. In an open relationship that requires sharing and trust, this manifests in strong desires not to embrace external knowledge (Not Invented Here) and not share internal knowledge (Not Sold Here). Both attitudes prohibit communication and the learning cycle between parties that leads to value creation (Amann & Granström, 2019; de Araújo Burcharth et al., 2014).

The results also found that the organisations values were strongly supportive of the collaborations with external parties. Schein (1992) indicates that within an organisation can also be evidenced in espoused values through visible artefacts such strategies, policies, communication. The research found that the organisation had clear support of external parties which included the policies to

seek out external ideas, programs to obtain ideas from the public constants communication by the leaders on partnerships. Based on the findings, the conclusion is that the cultural dimension exists and is effective.

Outcome: Cultural dimension fully exists and is effective.

Research proposition: Accepted.

5.1.3 *Importance of values cultural dimension (Research question 2)*

The concern for the loss of IP as a result of collaborating with external parties suggests there is a lack of awareness on the effective management of intellectual property within the organisation. In addition it suggests that there is a lack of psychological safety within the organization about sharing information externally.

A great concern with beliefs, as cited Schein (1992), is that as an underlying factor they influence basic decision making: while they may be invisible, they guide basic actions.

In an environment that requires a high degree of collaboration, a single party whose belief system restricts their ability to collaborate can hinder the whole process in a product development. Based on the interdependent nature of open innovation (Bigliardi et al., 2012) and the understanding that belief affects basic decisions, addressing the underlying concerns which are indicted 40% of the participants will have a significant impact on external collaboration. This attribute is therefore ranked as having a very high impact on external collaborations.

Outcome: Very important - High impact to external collaborations.

5.1.4 *Recommendations of values cultural dimension (Research question 3)*

There is a strong fear within the sector of a loss of IP. This was the primary reason (38%) cited for disadvantages of collaborating with external parties. The fear of

loss of IP demonstrated that there was lack of awareness of IP management as well as psychological fear loss when collaborating with external parties.

These underlying beliefs of negative consequences associated with sharing information with external parties limit the flow of information, limit learning and limit knowledge creation.

To address these concerns recommendations include **training the employees about IP management strategies and information governance practices**. Chesbrough (2015) indicates there is still a belief held in many organizations that IP is a defensive tool, and that many organizations do not know how to create additional value from their IP assets. Educating employees about IP management can create opportunities to increase the organisation revenue; it can better support inside out innovation; and also empower employees to collaborate freely rather than to prohibit collaborations. No evidence was found in the research on the presence of inside out, open innovation model.

The research did not find any evidence by the participants of IP loss materialising and resulting in losses; the belief of loss was nonetheless held strongly. This indicated that a **psychological safety must be developed to encourage collaborations**. It is recommended that open communication be encouraged internally and with external partners when collaborating on projects. Employees should be encouraged to freely share information that is beneficial to the objectives without fear of loss of competitive advantage. This should be done without negating the responsibilities of information governance and partnership management. The practice of cross collative teams must be endorsed promoting diversity of skills and capabilities. These activities should empower employees to feel comfortable about sharing information across organisations.

The results of the research did not assess or provide clarity on the alignment of values to action. Although the high degree of alignment in the beliefs and positive espoused organizational values towards external collaboration, this only serves as an indicator of action. It is recommended that an assessment of values and actions is undertaken. Such assessment requires evaluating whether the

organization consistently demonstrates its values in its decision-making and actions.

A positive culture is one that demonstrated by words that are not only said but practised i.e. where employees feel convinced, motivated, and empowered to act in line with their beliefs. Open innovation thrives in an environment where individuals feel empowered to voice their ideas and take risks without fear of judgment or retribution. Assessing the degree of alignment between stated values and actions is critical for creating a positive culture that supports open innovation and empowers employees to act in line with their beliefs. Organisations are therefore encouraged to monitor values and actions within the organisation.

5.1.5 *Summary*

Values are critical enablers for open innovation. Contributing factors include an alignment of employees' beliefs and supportive organizational values. The research reveals that there is the existence of the values cultural dimension that is critical for supporting open innovation in product development. However, if not actively managed through communication, and education, this can hinder open innovation by breeding a culture of fear of sharing information and collaboration. Managers, therefore, need to address the underlying concerns in order to foster the adoption of open innovation.

5.2 Discussion on orientation cultural dimension

Proposition 2. Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable.

5.2.1 *Introduction*

Market orientation refers to an organization's ability to generate market intelligence, disseminate it, and make decisions based on it (Kohli & Jaworski, 1990). It is described by Dobni (2008) as the market sensing and contextual awareness abilities of an organization and informs the understanding of its position in the market and its focus on customers and competitors. (Dobni, 2008; Johansson Alm & Jönsson, 2014). This awareness is what drives the business. An organization with a high awareness of its external environment is likely to be open to external collaborations and make innovation decisions that are conducive to open innovation decision (Cameron & Quinn, 2006; Mortara et al., 2010). This research study, therefore, sought to understand the organization's market orientation towards innovation as a cultural dimension with an impact on open innovation in product development.

Organizational adaptability refers an organizations ability to effectively and efficiently respond to changes in both internal and external its environment by modifying its structure, processes, and strategies in response to changes (Eisenhardt & Martin, 2000). The adaptation enables the organisation to remain competitive and resilient.

Cameron and Quinn (2006), indicate that a culture that is conducive for innovation is highly adaptable and is characterised by high levels of flexibility, empowerment of people, risk taking, and its agility. A number of researchers have similarly found that flexibility in an organizational culture is an enabler of open innovation (Lee et al., 2008; Mortara et al., 2010; Müller et al., 2019). The research study therefore sought to understand the organisations flexibility and adaptability as a cultural dimension with an impact on open innovation in product development.

To better understand how South African telecommunications operators can create organizational cultures are enabling for open innovation within their product development, the research identified **orientation** as a key cultural attribute that has an influence on open innovation in product development. The orientation cultural dimension was found to have two contributing factors, namely market orientation, and adaptability.

Based on the literature review, the second proposition developed was that *Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable*. To test the proposition, the focus and control of product development were assessed.

5.2.2 *Existence of orientation cultural dimension (Research question 1)*

To determine the existence of a market orientation and adaptable internal processes, two things were assessed namely, (i) the focus on the organization's product innovation to determine if it was internally focused on externally focused and (ii) the adaptability of the organization's product development processes and whether the employees felt they had autonomy and could easily make changes within product development.

The results indicate that the organization is highly market-oriented, demonstrated by the primary focus and driver of product innovation being competition and customer need (41%). The results were consistent across all product development teams and product portfolios, reinforcing the existence of a strong belief system within product development. The market orientation was highlighted by the primary requirement to compile a market intelligence report for all product development that indicated the product's position in the market and customer value proposition which was embedded in the organisation processes and supported by a number of business unit. This finding emphasised that an organisation market sensing capability and how it translates into actions was built into their structure and supported by infrastructure which is a key cultural dimension (Dobni, 2008). The research found that participants believed that there

was a strong belief and value that as a market leader, there was always an expectation from the leaders and the market for the organization to be first and be the best. This belief could be considered and path dependency, which was indicative of future product development decisions.

The participants also indicated that external collaborations were a necessary means to an end that they required to sustain leading position. As a result, the innovation processes were often externally extended by including customers in the innovation process and also leveraging external relationships to acquire knowledge the organisation did not have, deploy products quicker than internally, and also expand into markets which have not capacity or capability. This validated the findings that a market orientation is a both a source and a strong motivator for innovation (Arrigo, 2018; Hurley & Hult, 1998).

This revealed that despite the highly market-oriented culture and strong desire to lead in the market and outperform competitors, it was not contradictory to mutually beneficial collaborations with external parties and that in the case of open innovation, an external orientation is more conducive (Cameron & Quinn, 2006). This in turn suggests that for management to improve the maturity of open innovation, strong capabilities must be developed internally to understand the value chain, customer insights and competitors. This information must be used with ultimate goals to deliver superior products and improve value for the customer, and that this should supersede the underlying model or partnership i.e. partner where is makes sense for the goal.

With regard to adaptability, the research indicated that a high degree of participants (62%) felt that they had limited autonomy and that there was limited flexibility in the development of products and services. It emerged that whilst these two attributes were high in so far as operational decisions were concerned, this was not the case where the decisions had a revenue impact.

Participants indicated that for decisions which had a revenue impact, explicit management approval was required. They emphasised how revenue was a primary decision determinant. They expressed views that this culture within the organisation sometimes constrained their ability to be truly innovative. This

indicates a preference for more control and stability when it comes to finance in the organisation (Cameron & Quinn, 2006). Mortara et al., (2010) cite that this is a regulative cultural issue that prohibits open innovation and is evidenced when people use ‘numbers’ to cover their backs and are unwilling to take risks.

The loss aversion reflected in the sector prohibits innovation, especially in high-risk areas that lack a lot of information. This supports the recommendations of scholars like Mariana Mazzucato, who advocate for public partner partnerships where institutions like the government that have a higher tolerance for risk can support new breakthrough innovations that have a longer cycle to commercialisation (Mazzucato, 2011, 2018).

Participants highlighted a strong internal requirement for all partnership rules of engagement and decisions to always be enshrined in legal agreements or channelled formally through the SCM. This was perhaps due to the size of the risk that IP contravention would yield for large telecommunications operators. The fear of loss of associated revenue and IP which compels users to seek legal agreements and management approval reflects a lack of psychological safety again within the organisation that prohibits employees for taking risks or solving problems In relationships that permeate the boundaries of the organisation this creates mistrust and prohibits the flow of information (Amann & Granström, 2019; de Araújo Burcharth et al., 2014).

These findings indicate a culture that is risk-averse and short-term due to an overemphasis on immediate return and legal security. This type of culture prohibits innovation, especially disruptive and ground-breaking innovations where the initial business case has not yet been fully formed. This suggests that for management to improve the maturity of open innovation, an appetite for financial uncertainty must be defined, and product development teams given autonomy to make decisions. Based on the research the conclusion is that the cultural dimension exists but is partially effective.

Outcome: This cultural dimension partially exists and is partially effective.

Research proposition: Partially accepted.

5.2.3 *Importance of orientation cultural dimension (Research Question 2)*

The results indicate a strong capability for gathering information about the market and the data to make decisions has an impact on external collaboration and that flexibility within the organisation offers significant benefits in efficiencies, and empowering creativity and risk taking amongst employees.

Based on the existence of current state of orientation within the organization, characterized by moderate flexibility and a very high market orientation, addressing the underlying concerns i.e. increasing flexibility (authority to make financial decisions, and technical decisions) and curbing excessive market orientation is important. The evidence suggests that this will have an important impact on external collaborations. This attribute is therefore ranked as:

Outcome: Very important - High impact to external collaborations.

5.2.4 *Recommendations of orientation cultural dimension (Research question 3)*

The research found that the organization was highly market-orientated. With the primary orientation driver being competitors at 41%. The research did not investigate or provide clarity on the type of market orientation that is optimal to support open innovation. Findings indicate that there was a concern amongst the employees about an excessive focus on the competition.

A recommendation is therefore to **promote a healthy market competition**. Whilst the research did not explicitly investigate a what a healthy market orientation is, literature indicates that companies that are overly focused on outperforming their rivals can fall into the trap of neglecting the exploration in a bid to surpass their competition on the short term, which is indicative of a toxic culture (Alvesson, 2012). This is evidenced when organizations find themselves trapped in a cycle of imitating and reacting to their competitors rather than leading the way with originality and visionary thinking. It is therefore important that the orientation on the market is well managed to ensure sustainable performance.

The research also found that within **adaptability**, there was a strong *fear of revenue loss* (62%) when making decisions in product development that impacted revenue or became too complex. This was the biggest determinant of organizational flexibility. This fear prohibits risk-taking and experimentation and limits the rate of discovery of new innovations.

The recommendation is to ***develop a tolerance for losses*** and uncertainty within the organization. Due to the nature of innovation which involves a degree of venturing into space with limited information, there is an inherent risk of loss or a high degree of uncertainly (Goffin & Mitchell, 2016). The organisation needs a clearly defined risk tolerance and appetite in innovation management. This can be done by defining risk appetites for tolerances losses and dedicating resources for experimentation. These can be technical environments for experimenting highly technical products or financial amounts that the organisation is willing to lose in trying out new ideas. These should then be communicated to employees and the product development team. Clear tolerances make employees comfortable about losses but also support learning in the process.

Additionally, it is recommended a culture of ***using failure for as an opportunity to learn*** *is developed.* Failure should be used an opportunity to learn rather than to shame and blame. Employees should be encouraged to make decisions and to act on them. Where mistakes are made, learnings must be ploughed back into the product development process (double loop learning). Leaders can also play a role by sharing their lessons on failures. In an open environment, learnings should be shared with all parties and leveraged in future similar projects.

5.2.5 *Summary*

Market orientation is critical for the success of open innovation in product development. There is evidence of its presence in this cultural dimension. Managers need to continue having a good sense of the market, but must balance the competitive goals with the value creation goals i.e. not to compete where it makes sense to collaborate. By balancing the competing goals, open innovation can both thrive and promote healthy competition.

In addition, organizational adaptability is important for the success of open innovation. There is evidence of this cultural dimension, however it is only moderate. Managers need to have a higher appetite for failure, create higher financial uncertainty tolerances and give employees more autonomy to make decisions. Such an environment creates a locus of control that favours empowerment, autonomy, and risk-taking.

5.3 Discussion on Infrastructure cultural dimension

Proposition 3. Telecommunications organizations that practice open innovation have internal structures & processes that are enabling for innovation and external collaborations.

5.3.1 *Introduction*

Innovation infrastructure refers to the extent to which the organization has support systems that capacitate employees for innovation (Dobni, 2008). This includes policies, systems and structures that are in place to enable innovation. For open innovation, this infrastructure must effectively extend the boundaries of its innovation processes and enable the efficient flow of external flows of knowledge with external parties (Bigliardi et al., 2012; Mortara et al., 2010). The research therefore sought to understand the organization's infrastructure towards external collaborations as a cultural dimension with an impact on open innovation in product development.

To better understand how South African telecommunications operators can create organizational cultures are enabling for open innovation within their product development, the research identified **Infrastructure** as a key cultural attribute that had an influence on open innovation in product development. The **infrastructure** cultural dimension was found to have two contributing factors, namely innovation management and collaboration structures.

Based on the literature review, the third proposition developed was that *Telecommunications organizations that practice open innovation have internal structures and processes that are enabling for innovation and external*

collaborations. To test the proposition, the innovation management structure was assessed and the collaboration structures.

5.3.2 *Existence of infrastructure cultural dimension (Research question 1)*

The research indicates that the organization has a dedicated innovation function that is responsible for the coordination of innovation efforts throughout the organization. This was evidenced by all of the participants (100%) indicating that this is the only structure and process they relied for innovation management in the organization.

The organizational structure was characterized by a traditional functional design, with dedicated responsibilities, its own reporting line, its own cost centre, and its own staff. The innovation function had established programs to manage both internal and external innovations and filter these through the respective teams within the organization. This dedicated structure is supplemented by innovation champions whose role is to coordinate innovation activities within their respective functions.

The research revealed that whilst a centralized innovation management structure was effective at coordinating the collection of ideas and creating a strong pipeline of ideas through various mechanisms such as incentives like hackathons, awards, and innovation challenges from both internal and external parties, these always materialized as commercialised or acted on products. The research identified the biggest challenge experienced with this model is that innovations identified were not always prioritized or actioned by the various internal teams, thus curtailing the outcomes of the program. This failure validated the research, but Goffin & Mitchel (2016) recommend that the effective innovation management needs to be built on a framework that considers the whole value chain of innovation.

A contributing factor for the low output was that innovation was not a KPI for the executives or the innovation champions. These findings confirm the shortcomings of this organizational design structure which includes misalignment of goals, silo

operations, and misaligned incentives (Goffin & Mitchell, 2016). A number of participants cited that they experienced little to no effect of the innovation managed office impact in product development.

This structure was likely developed to ensure a dedicated focus on innovation and to build a centre of excellence that would capacitate and support the rest of the organization. Organizations like telecommunications operators require a high degree of collaboration (Gupta et al., 2007). The current structure division is not effective and should be replaced with more ambidextrous and permissionless structure (De Mello et al., 2012; Goffin & Mitchell, 2016).

The research also indicated that while a process existed for the identification and sourcing of ideas and external parties, these were the same processes that were applied in business-as-usual closed innovations. These are the standard supply chain, legal and other specialized assurance processes that are in place to support collaboration. Participants indicated that it was these processes that became the biggest constraint in collaborating and allowing for a free exchange of information. The research found that the existing processes had a bias towards big and established firms and towards parties with existing contractual agreements and also to honoured requirements.

The newly established financial services function, which relied extensively on external partnerships, indicated that the processes were not flexible enough for a purpose that involved non telecommunications processes. They demonstrated that traditional structures in the organization were only effective at supporting the existing way of doing things for existing products. This meant they are designed for close innovation and for core products where incremental innovations were common. However, for products that were not core, such as financial services and models that open like external partnership, the structure was not effective.

These findings validate that the effectiveness of open innovation requires a supportive organizational infrastructure. In addition, such structures must also take into account the type of innovations. Organizational structures must therefore be dynamic and adaptable to suit the different types of relationships

and types of partners and support for the business. Based on the research the conclusion is that the cultural dimension exists but is partially effective.

Outcome: This cultural dimension partially exists and is partially effective.

Research proposition: Partially accepted.

5.3.3 *Importance of infrastructure cultural dimension (Research question 2)*

The results indicate an innovation function within the organization that is partially effective. The function demonstrates strong abilities to source ideas but lacks the ability translate these into products indicating a misalignment of objectives due to the organizational structure. In its current implementation, the structures face the biggest limitations internally with driving executions. The evidence suggests that changes under the current implementation will not drastically affect external collaborations.

However, whilst the organisation has processes of partnerships, these are not built for open innovation and create the biggest bottleneck in the entire development process. These are processes that guide every stage of the open innovation process. The evidence therefore suggests that addressing the collaboration structures and processes will significantly impact external collaborations. This attribute is therefore ranked as:

Outcome: Very important - High impact to external collaborations.

5.3.4 *Recommendations of infrastructure cultural dimension (Research question 3)*

The research also found that 100% of the participants relied on the centralized innovation managed office, however there was low out of products delivered via the channel and the participants felt that the innovation program was not well integrated into the product development process.

As a recommendation, the organisation should consider developing structures within the organisation that are better aligned and integrated. The **innovation management structure should be ambidextrous and integrated into the organisation business units**. The current dedicated functional structures for innovation management perpetuate silos and misaligned innovation objectives within the organization.

To create enabling structures, it is recommended that the innovation management structures become cross-functional, cross-organizational, comprising of representation by members from across the organization and integrated into all divisions within the organization. In open projects, these teams should also compromise of people external to the organization. These integrated teams are able to function as autonomous units pursuing the objectives of the project with a higher degree of trust between each other.

It is also recommended that **innovation KPIs** be integrated across the organization from the senior leaders to the junior levels in the organization. It is suggested that innovation KPIs become an integral part of the various department goals so that innovation is not perceived as a function, but as a way of operating.

The research also found that 83% of participants leveraged the current business as usual partnering processes. Participants indicated that they were not adaptable enough for open innovation.

A recommendation is that the business develop **collaborative agile partnership processes** – These are trust-based organizational structures that promote adaptability (speed). These include flexible governance structures, flexible legal agreements, shared liabilities, intentional sharing of intellectual property, and resource and risk sharing. These procedures are built on trust between parties and enable product teams to react quickly to the market. These can include open knowledge sharing agreements, multiple business modes, and agile project delivery etc.

5.3.5 *Summary*

Infrastructure is critical for the success of open innovation in product development. There is evidence of this cultural dimension, however, telecommunications have applied traditional approaches. Telecommunications operators with a large degree of external collaborations have undertaken open innovation strategies using their traditional ‘closed innovation processes’, such as innovation management and partnering management. Whilst these were effective in closed innovation against a dynamic operating environment, they are not fit for explorative partnerships with external partners. Open innovation requires processes that are flexible and adaptable while minimizing risks.

5.4 Discussion on Implementation cultural dimension

Proposition 4. Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation.

5.4.1 *Introduction*

Implementation context refers to the circumstances or conditions that surround an implementation whilst implementation refers to the conceptualized, planned and deliberate effort for which a planned activity is performed (Pfadenhauer et al., 2015). In an organization where open innovation is successful, implementation context can be evidenced by the organisations' ability to leverage external partnerships in the product development process (Chesbrough, 2003, Gupta, 2007) and assessed by analysing the conditions for those partnerships. Dobni (2008), further states that an indicative measure of an innovative culture is an organization's ability to direct its activities to create value. Within open innovation, value is co-created in collaboration with external parties. The research study therefore sought to understand the organisation's external partnerships (who) and the role of such partnerships (what value) towards innovation as a cultural dimension with an impact on open innovation in product development.

To better understand how South African telecommunications operators can create organizational cultures and are enabling open innovation within their product development, the research identified **implementation context** as a key cultural attribute that had an influence on open innovation in product development. The implementation cultural dimension was found to have two contributing factors, namely idea sourcing and partnerships.

Based on the literature review, the fourth proposition developed was that *Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation*. To test the proposition, the sources of ideas and the types of partnerships were assessed.

5.4.2 *Existence of implementation cultural dimension (Research Question 1)*

The results revealed that the primary source of product ideas was organization's senior management teams (52%), albeit largely influenced by vendors and customers. An environment that is excessively controlled by those in power demonstrates an autocratic culture that does not promote innovation, in such environments means that employees are not empowered to make decisions and take risks (Goffin & Mitchell, 2016; Klajkó et al., 2020). These results are congruent with the findings on adaptability within the organization and found that management was one of the key flexibility and autonomy determinants of flexibility within products and that financial products that had financial impact required management approval.

Organizations that actively seek out input from employees and customers benefit from diverse perspectives and insights that lead to the generation of more innovative products (Andersson et al., 2020; Büschgens et al., 2013).

The research results also indicated that the organization had a significant number of external partnerships largely dominated by technology partners (34%), managed service partners (26%), and consulting partners (21%). This supported findings by Gupta (2007) that telecommunications product services development leveraged an extensive number of external collaborations due to the nature of services that are required to be interoperable and operate across a wide range of technologies and regions. As a result, the research found that the most common types of partnerships were technology partnerships for technical services and technology developments. These partnerships provided for hardware and software supply, development, and maintenance and were largely provided by global vendors and specialized technology partners. The value of these partnerships was that they enabled external knowledge inflows due to the exposure of the partners operate globally and across partners.

This validated research that many organizations use open innovation as a strategy to enable technology transfer by opening channels for knowledge inflows from outside the organisation(Adesida et al., 2021; Birudavolu & Nag, 2011).

The research revealed that the technology vendors' authority was very dominant in the innovation process as most services were built on their capability and as a result, innovation possibilities were defined by them. Contracting with smaller technology partners was often impossible due to barriers such as multi-year contracts, scalability of services, and interoperability concerns. This behavioural attribute not only stifles open innovation but exposes the organization to the risk of disruption by smaller and niche players. Additionally, the pervasive use of outsourced managed service providers to provide fully managed services on behalf of the organization validated the value of external collaborations. The research revealed that a benefit of external collaboration was that external partners were able to assume risks that the organization was not willing to take and to offer more specialization than the organization was able to provide for. Concerns noted were that partners could develop services and that freely contract with other operators, which the organization felt would compromise their competitive advantage**.**

Furthermore, the dominance of a single type of partner (technology partners) indicates that there is a dependency on this partner which creates dependency risk, in addition, the lack of strong relationships with other partners such as educational institutions and communities indicates that the innovation current innovation system is not effective at supporting primary innovation at the knowledge creation level, typically by academia, and then enabling diffusion which requires strong relationships with the communities (Gupta et al., 2007). From a national government perspective, the current profile of external parties in telecommunications will not lead to inclusive innovation.

Whilst telecommunications organisations have external collaborations who provide ideas and resources, the findings suggest that these are largely inherent by nature and dominated by technology partners which does not promote diversity of innovations. Based on the research, the conclusion is that the cultural dimension exists but is only partially effective.

Outcome: This cultural dimension partially exists and is partially effective.

Research proposition: Partially accepted.

5.4.3 *Importance of implementation cultural dimension (Research Question 2)*

The results indicate there is a presence of external collaborations that are used for sourcing of ideas and innovation of products. These relationships are, however, largely traditional and focused on the same partnership types. This is perhaps due to the nature of the sector which is technology based. The evidence therefore suggests that addressing the implementation will have a moderate impact on external. This attribute is therefore ranked as:

Outcome: Moderately important – Moderate impact to external collaboration.

5.4.4 *Recommendations of implementation cultural dimension (Research question 3)*

The research found that product development primarily consisted only of three types of partners namely technology partners (34%), managed service partners (26% and consultants (21%). This indicated that the technology partners had a big influence on determining the direction of product development.

It is recommended that the organization **extends its collaboration bases** to include a wider pool of stakeholders, which includes educational institutions, government, communities, and non-commercial entities. It is important that these pools have a strong bottom-up capability source ideas and feedback from the citizens and smaller organizations. These partners are instrumental for promoting technology transfers and building an eco-system that is able to support innovation and improve adoption. Technology transfers require strong collaborations in the innovation system.

5.4.5 *Summary*

Implementation context is important for the success of open innovation, and organisation ability to be deliberate about collaborations, plan, execute and create value is critical. There is evidence of external collaborations in the product

development processes, however these are still largely dominated by technology partners. This dominance not only limits the diversity of ideas and resources in the innovation process, but it also suggests that there are ineffective knowledge transfers in the collaborations. Therefore, widening and strengthening the network is important to enhance innovation.

5.5 Priority of recommendations

5.5.1 *Methodology*

To assist the organisation with deciding on which cultural attribute to address first, a prioritization matrix is developed based on the principles of the Eisenhower framework. The Eisenhower framework, which is a 2x2 matrix, is an effective tool when there are a number of actions and solutions in which to solve a problem. The framework assists in determining priority based on urgency and importance and task (Bratterud et al., 2020; Jyothi & Parkavi, 2016) . Based on the research questions 2 and 3, a similar 2x2 matrix was created. This matrix assigns priority based on two dimensions, namely the **existence of the cultural dimension and the importance of the cultural dimension.**

Existence is aligned to research question 2 and measures the presence of the cultural dimension and *how effective it is*. As all dimensions were found, only two scales were used. Table 15 below gives an overview of the rating.

Table 15: Existence rating scales of cultural dimension

Score	Rank	Description
2	**Fully exists**	Cultural dimension exists and is effective
1	**Partially exists**	Cultural dimension exists and is partially effective

Importance is aligned to research question 3 measures *How much impact the cultural dimension will make to external collaborations* and *how important it is*. Table 16 below gives an overview of the rating.

Table 16: Impact rating scales of cultural dimension

Score	Rank	Description
2	**Very Important**	Cultural dimension will have a high impact to external collaborations in the current environment
1	**Moderately important**	Cultural dimension will have a moderate impact to external collaboration in the current environment

In this priority matrix the recommendations evaluated are based on their level of effectiveness and importance. In Table 17 below is the description of each quadrant.

Table 17: Priority ratings description

Priority	Rank	Description
Priority 1	**Fully exists & Very Important**	These are the activities that have both high effectiveness and high importance. They should be given the highest priority as they are critical to achieving desired outcomes and have a significant impact on overall success.
Priority 2	**Fully exists & Moderately important**	These are activities that are highly effective but have relatively low importance. While they can contribute to positive outcomes, they may not have the same level of significance as Priority 1 activities. They should be addressed after Priority 1 tasks but still be recognized for their potential impact.
Priority 3	**Partially exists & Very Important**	These activities that are highly important but may have lower effectiveness compared to other items. They should be evaluated carefully, considering alternative approaches to improve
Priority 4	**Partially exists & Moderately important**	These activities have both low effectiveness and low importance. They should be given the lowest

5.5.2 *Priority rating*

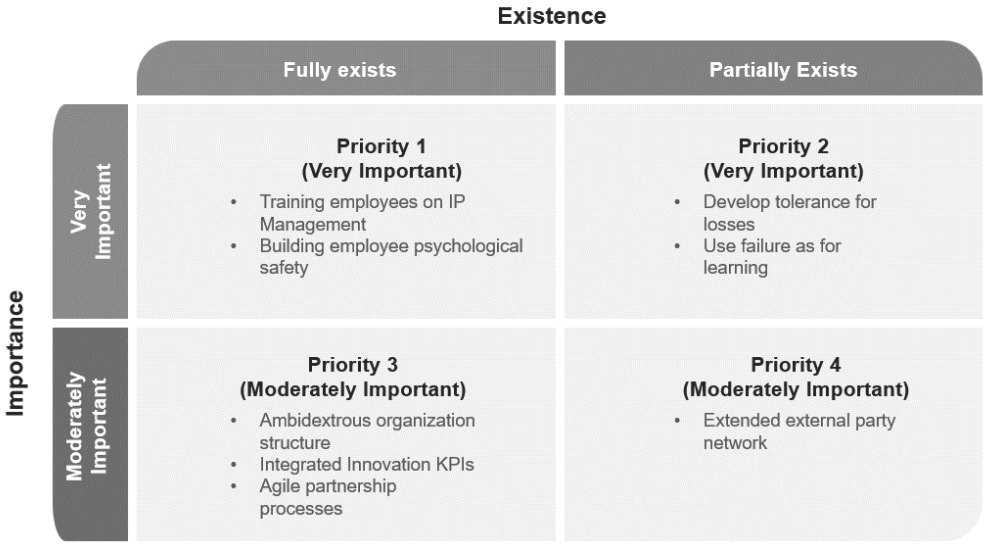
Table 18 shows the outcomes of the ratings.

Table 18: Recommendations priorities ratings

Proposition	Existence of the cultural dimension	Importance of the cultural dimension	Priority of recommendations
Proposition 1: [values] Telecommunications organizations that practice open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations	**Fully exists**	**Very important**	**Priority 1**
Proposition 2 [orientation] Telecommunications organizations that practice open innovation have an orientation that is focused on the market and internal processes that are adaptable	**Partially exists**	**Very Important**	**Priority 2**
Proposition 3 [infrastructure]Telecommunications organizations that practice open innovation have internal structures & processes that are enabling for innovation and external collaborations.	**Partially exists**	**Very important**	**Priority 3**
Proposition 4 [implementation context] Telecommunications organizations that practice open innovation leverage external collaborations to enhance product innovation	**Partially exists**	**Moderately important**	**Priority 4**

Figure 18 depicts the ratings plotted in a matrix.

Figure 18: Recommendations matrix plot



5.6 Directions for future research

Directions for Future Research in Open Innovation Culture.

Learning Systems - Future research should examine the effect of learning systems in fostering and building an open innovation culture. This research did not investigate learning as an explicit dimension of innovation culture, but it is important to understand how learning systems contribute to the development of open innovation culture. Such systems could include training, collaboration approaches, peer learning, community learning etc. Training programs can equip employees with the necessary skills and knowledge to effectively participate in innovative practices, while training on collaboration and soft skills can develop skills that promote teamwork and knowledge sharing among employees and across the boundaries of the organization.

Peer learning is another learning system that facilitates knowledge transfers by enabling individuals to learn from each other. Community learning is another learning system that involves learning from a wide pool of external people such as customers, communities, and suppliers. This may also enable the utilization of indigenous knowledge to further support open innovation. By examining the impact of learning systems on innovation culture, future research can provide valuable insights into how organizations can create an environment that promotes openness, creativity, and collaboration.

Reward systems - Future research could examine the effect of reward systems in fostering open innovation reward systems. This research did not investigate rewards as an explicit dimension of innovation culture, but it is important to understand how reward systems can play a crucial role in fostering open innovation. Rewards are a powerful motivator and incentive for individuals and can act to promote behaviours that encourage sharing of ideas, knowledge, and expertise with stakeholders. Additionally, rewards may impact commitment and engagement to innovation. By examining the impact of rewards on innovation culture, future research can provide valuable feedback on how incentive and motivation for open innovation can be supported

Leadership - Future research could investigate the role of leadership styles in fostering open innovation culture. This research did not investigate leadership styles as an explicit dimension of innovation culture, but it is important to understand how different leadership styles impact influence the beliefs, attitudes and behaviours of employees toward innovation and collaboration. Additionally, how leadership culture can empower employees, nurture creativity and promote risk-taking, and promote external collaboration, which is critical for open innovation by examining the area of leadership in open innovation culture, future research can provide direction and leadership actions that enable open innovation in organizations.

National Innovation Systems - Future research could investigate the role of innovation systems in fostering open innovation. This research did not investigate innovation systems as an explicit dimension of open innovation culture, but it could consider the various actors in the innovation system and the strength of the relationships and ease of communication among these partners affect open innovation. In addition to the relationships, this can also include the national policies and regulations that guide and shape the relationships. Exploring the broader innovation system can shed light on culture within complex systems (national and regional culture systems). This may assist policy makers and organization leaders who collaborate in wider systems to develop cultures that are conducive for open innovation and national development goals.

Intellectual Property management frameworks in South Africa – Future research could investigate the impact of the intellectual property management legislation and governance framework on open innovation. This may provide insights into the underlying concerns expressed in the research that led to concerns over sharing information with external parties.

Rapid open innovation culture assessment - methodology applied to assess the organisation culture and determine prioritisation matrix generated results that are largely contextual to the research organization (lack generalizability), however the model could be further developed and applied to any organisation that seeks to assess their open innovation culture.

5.7 Summary of discussions

The results indicate that South African telecommunication operators practice open innovation as a strategy to enhance their innovation capabilities. Furthermore, there is an appreciation of critical cultural attributes that impact open innovation.

The results found that within the organization the individual beliefs and the organizations value system were supportive of external collaborations, however, there was a strong underlying fear of sharing information with external parties. Concerns were associated with loss of competitor position, legal liability, and inability to control quality. Such beliefs can hinder the flow of information with external stakeholders which manifests in behaviours where staff do not want to embrace external information (Not Invented Here syndrome) and resist sharing information (Not Sold Here syndrome). In response, managers need to build the capacity and the confidence in staff to share information. Teaching employees about various IP management strategies and information governance practices will not only build confidence in sharing information with other external parties but will also enable the business to explore other strategies to create value from the IP assets such as inside-out business models and other go-to market strategies i.e. licensing, spinouts and the creation of new ventures. The research did not explicitly investigate the alignment of behaviours and actions, yet this is an activity in which the organization monitors, and future research can focus on.

The results also found that the organization had a strong focus on the market which was competitor and customer driven. Evidence indicated that product development had strong market sensing capabilities which informed their product innovation decisions, however at times there was an excessive focus on the market which could hinder innovation. A hyper-focus on competitors results in a toxic innovation culture that leads to imitation, price competition, and a follower mentality as well as resistance to collaborating with other parties even when it makes sense. Building a healthy market orientation that is not hyper-competitive will enable collaboration. The research did not explicitly investigate market orientation types that are conducive for open innovation. This is an area that future research can focus on.

The results also found that the internal environment had a degree of adaptability and flexibility which is key to responding to market needs, but there was still a preference to exercise rigid control where decisions had a revenue impact or were technically complex requiring management approval. Such a culture disempowers the employees and limits their ability to explore new innovations. In the case of external collaborations, where technology interoperations were required, this culture hindered projects and also for breakthrough and disruptive innovation, such a culture was restrictive. Empowering the staff and trusting them to make decisions, defining risk appetite and tolerances for innovation, and promoting learning from failure would assist in building a responsive and adaptable culture.

The results also found that the innovation management function was a dedicated business unit that was effective at soliciting ideas from inside and outside the business but was not effective a translating these into delivered products. The functional structure approach resulted in the function not being integrated into product development and misalignment in objectives. By building a cross-functional, ambidextrous function, innovation management would better support product innovation that connects external parties with product development more effectively. The research did not explicitly investigate the relationship between organization design type and open innovation. This is an area that future research could focus on.

The results found that the organization largely relied on existing business processes and structures to support open innovation strategies, however, these structures were built for closed innovation processes and were not efficient in supporting external collaborations and the interactions required as well as new innovation models. In addition, the existing processes had an inherent bias against smaller actors due to the onerous requirements. As a result, open innovation was hindered. By building internal structures that are agile, trust-based, and flexible, the organization is will be able to collaborate with a wider set of partners, enable a free flow of information and engage in mutually beneficial commercial agreements that are sustainable.

The results also indicated that whilst the organization involved external parties in product development to enhance innovation, this was largely dominated by large technology-type partners. These partners, including the vendors, had a very dominant influence on product innovation and product roadmaps. While the partner profile type was inherent due to the nature of the sector, this dominance prevented exploration into new types of product innovation and presented a key dependency on these partners. To promote innovation that supports these goals of the organization and the national goals of inclusive innovation, the organization should widen the profile of partners to ensure that there is variety in terms of size and type. A diverse network of partners with strong relationships promotes innovation creation and diffusion. These findings suggest that there is an ineffective knowledge transfer from the technology partners into the organisation. The research did not explicitly investigate the quality of relationships and learning system in the relationships with external partners.

Leaders need to channel efforts toward building a culture that empowers staff, promotes collaboration, and structures that make inter-organisation interactions more efficient. A list of recommendations and priority is provided, based on where evidence suggests the biggest immediate value can be obtained. The priorities are not prescriptive but are meant as a guidance for practitioners. Focus must be given in the following order:

1. Values cultural dimension - build values that support external collaborations.
2. Orientation culture dimension - build adaptability in the organisations processes and teams that promote agility and learning from failure.
3. Infrastructure culture dimension - enhance the organisation structures for external collaborations.
4. Implementation cultural dimension - strengthen the quality and diversity of external partners.

The recommendation are practical methods that the organization can use to unlock value, and the prioritisation provides a guideline on how these should be undertaken based on impact to external collaborations considering the current level of effectiveness and embeddedness.

CHAPTER 6. SUMMARY OF STUDY

6.1 Research Summary

The adoption of open innovation has been increasing within telecommunications. The research sought to understand how South African telecommunications operators can create organizational cultures that are enabling for Open Innovation within their product development with the objective of reducing the failure of open innovation initiatives in the sector.

A comprehensive literature review indicated that local challenges in the sector driving the need for open innovation were a lack of financial resources, lack of infrastructure, and lack of progressive regulation. Operators were pressured against this backdrop to innovate their products due to increased customer demands and competitive activity.

The research sought to find answers to two key questions namely: is there an innovation culture that motivates the success of open innovation within South African telecommunications product development, and are there recommendations for the industry that could improve the success of open innovation within South African telecommunications product development?

The research design undertook an explorative qualitative approach. This method was adopted because organizational culture is a complex and multi-dimensional construct. Furthermore, there was little research done on the subject specific in the region. This approach therefore sought to gather rich information on the subject and to generate new insights on the subject.

The research comprised of two data collection methods. Firstly, a comprehensive literature review of the existing literature and industry reports, followed with semi-structured interviews. A content analysis was conducted on the literature and reports and the thematic and sentiment analysis was conducted on the interviews.

To ensure the generalizability and accuracy of data analysis, an interview guide was created based on the key theoretical constructs. The research sample comprised one telecommunications operator in the sectors who held a leading market position both in scale and in performance and there was a good representative of the sector, which comprised largely of four operators, two large and two small. 26 participants, who were from the innovation and product development office, were interviewed for the study. The participants included all levels of employees from junior managers to senior leaders. The two functions were selected as they were the custodians of the innovation and product development processes in the organization.

The literature completed literature review identified four cultural dimensions associated with open innovation, namely values, orientation, infrastructure, and implementation context. This led to the development of four propositions to provide insight into the research question. The four propositions were:

1. Telecommunications organizations that practise open innovation have shared beliefs by employees that are supportive of external collaborations and organizational values that are supportive of external collaborations – **Accepted.**

2. Telecommunications organizations that practise open innovation have an orientation that is focused on the market and internal processes that are adaptable – **Partially accepted.**

3. Telecommunications organizations that practise open innovation have internal structures and processes that are enabling for innovation and external collaborations – **Partially accepted.**

4. Telecommunications organizations that practise open innovation leverage external collaborations to enhance product innovation – **Partially Accepted.**

The research results indicated revealed that the four cultural dimensions were important to in promoting innovation. The research further found that:

- Telecommunications organizations that practise open innovation have deep-seated values that are aligned and support external collaboration.

- Whilst benefits such as costs, ideas and resources were believed, there was a big fear of IP loss and liability when collaborating externally.
- Telecommunications organizations that practise open innovation have supporting an orientation that is focused on the market and customer as opposed to internally.
- A focus on the market is both a motivator and driver for collaborating (competition and mutual befit simultaneously). However, unchecked an over-emphasis on competition could hamper innovation.
- Telecommunications organizations that practise open innovation have processes internally that are adaptable and flexible and able to respond to market needs, under which individuals are empowered to make decisions.
- There were moderate levels of flexibility and higher degrees of control present for decisions that have a financial impact or were highly complex.
- Telecommunications organizations that practise open innovation have the supporting infrastructure open external collaboration.
- Existing processes and structures that were used for closed innovation /business and usual processes and when applied to open innovation or external collaboration were inefficient.
- Telecommunications organizations that practise open innovation have the supporting partner with external parties to deliver products and enhance products.
- Product ideas were largely sourced internally from senior management and that the biggest types of external parties were technology partners, which largely influences the product roadmap.

Recommendations included from the study include.

Priority 1 - Fostering psychological safety for employees to overcome the fear of IP loss and revenue loss, which prevented risk-taking and the flow of information with external parties.

Priority 2 – Build in flexibility in internal process that promotes risk taking, supports experimentation, has a defined appetite for losses, and uses failures to learn and enhance future product innovations.

Priority 3 - Building innovation organizations structures that are ambidextrous and more integrated into the business. This should be supplemented with shared innovation KPIs to promote more innovation outcomes i.e. improve output of innovation.

Priority 4 - Increase the network of external actors involved in product innovation. This enhances the quality of innovation and promotes better diffusion of innovation.

The research indicates that South African telecommunications operators have an appreciation of open innovation and its benefits. They have organizational culture attributes that are enablers for innovation. However, the maturity is low because they have a lack of understanding and lack of processes required to enhance the outputs of open innovation.

The study did not provide clarity on

- Alignment of values to actions that influence the development of products with external parties.
- Relationship between adaptability and time to market or efficiencies in the development of product with external parties.
- Type of market orientation that best supports open innovation.
- Type of organization structures that best support open innovation (organization design).
- Amount and type of organizations resources that best support open innovation.
- Types of external parties that best support open innovation (innovation systems thinking).
- Knowledge transfers that best support open innovation (learning systems).

6.2 Conclusion

Open Innovation strategies increase an organization's innovation capacity by leveraging knowledge and resources from parties outside the organization. This strategy is becoming increasingly popular as a method to enhance product innovation as it reduces capital outlay, and R&D costs, in addition through collaboration with wider pool of stakeholders, organizations benefit from increased knowledge and ideas.

In South Africa, and other counties in the region, open innovation is considered an important way to enhance the country's innovation capacity and achieve economic development goals. Through collaboration with advanced stakeholders that are leading in their respective fields and collaborating stakeholders in developed economies. Open innovation is envisioned to promote knowledge sharing and spillovers to the region. Through increasing the regions' knowledge base there is a hope that this will lead to economic catchup and drive secondary innovation. As a result, the Department of Science and Innovation is actively promoting the creation of innovation systems in the country that brings together diverse stakeholders to promote knowledge creation, innovation development and innovation diffusion. A significant part of the ambitions in the region is to create an inclusive innovation system that is indigenous and reflects the country's diversity. Open innovation is therefore a strategy that supports the national vision.

The research reveals that culture is a critical factor in influencing the success of open innovation. An open innovation culture is one where there is a shared mindset and practices that actively seek out and incorporate external ideas into the organization. The study investigated organizational culture within telecommunications and how it impacted open innovation in product development.

The study found four cultural dimensions that are critical for open innovation in product development, namely values, orientation, infrastructure and implementation context. The study found that South African telecommunications had an appreciation in all of the critical cultural dimensions that had an impact on open innovation in product development, however not all of them were well

practised or well embedded. For open innovation to mature, managers would need to address these. Three main themes emerged were that:

In general, firstly there is a clear support for open innovation within the organisation demonstrated by the individual beliefs of the employees and the organisational values, however there is still a strong underlying fear of loss resulting from sharing intellectual property. To promote open innovation requires deeper understanding of intellectual property management and strategies. This will not only lead to creating a psychological safety for employees to share information across the boundaries but can also create new avenues to exploit intellectual property assets and further create value.

Second, there is clear indication that whilst the sector engages in open innovation activities, the organization structures and processes create the biggest hinderances and thus limit the efficient flow of information with external stakeholders. The current structures were built to support closed innovation processes and core products. In order to promote open innovation and edge innovations, investment is required to establish more structures. In addition, the current structures must be optimised to facilitate inter-organisational transactions. In order to achieve this, a more ambidextrous structural approach is required.

Thirdly, while there is indication that the organisation collaborates externally to innovate its products, the collaborations are dominated by technology partners who largely dictate the direction of product development. To improve and promote innovation, a more diverse and inclusive network is required. Such a network is able to access non-traditional knowledge pools, access primary knowledge centres such as academia and indigenous knowledge. A more inclusive innovation network is able to better stimulate and diffuse innovation.

The research concludes by providing a priority of the recommendations that can enhance external collaborations and enable open innovation based on the current status of the existing cultural dimensions. While the priority is not prescriptive, the suggestions are the cultural dimensions recommendations are

tackled in this order (1) Build values that support external collaborations, (2) build adaptability in the organisations processes and teams, (3) enhance the organisation structures for external collaborations and (4) strengthen the quality and diversity of external partners. These recommendations provide practical methods for practitioners that can unlock value for the practitioners' organisations.

Based on the findings, South African telecommunications that adopt open innovation can enhance their organisational culture to build a culture that will promote external collaborations and enhance the overall innovation in their product development, ultimately contributing to national and economic development.

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