

The Interaction of Innovation Networks, Frugal Innovations, And Organizational Readiness In The Circular Economy

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Abstract

There are new chances for every sort of company because of technological advances. In today's technologically advanced world, innovation is critical to the success of commercial landscape operations. As a result, this study examined an IN's impact on organizations' innovativeness (OI). Frugal innovation (FI) and organizational preparedness have also been investigated as mediating factors in the relationship between FI and OR. Cross-sectional data collection from small and medium-sized enterprises (SMEs) was used in this research. A total of 442 business owners and managers correctly answered the survey's questions, which were then analyzed. The present study's hypotheses were tested using SEM. An organization's innovativeness is boosted via an innovation network. Results also show that frugal innovation acts as a mediator between networks of creative individuals and the ability of organizations to innovate. Circular economy, small businesses rely heavily on their creative efforts. The sustainability of small and medium-sized businesses (SMEs) in today's dynamic market depends on their ability to maintain a high level of organizational innovation in their offerings.

Introduction

Organizational innovativeness is a hot topic among academics and has emerged as a critical consideration in today's fast-paced business climate. Business leaders are under increasing pressure to implement cutting-edge, digitally-enhanced processes and technology (Yousaf et al., 2022). Networks of innovators make it feasible for new technologies to be developed and aid conventional corporations in their transition to the new circular knowledge-based economy (Harrisson and Laberge, 2002). SMBs are increasingly turning to the circular economy to help them rethink their business models and reduce their dependence on conventional manufacturing processes while generating better outcomes for people, the environment, and their bottom lines (Alhola et al., 2019). When paired with the growing technological vitality, it becomes more difficult for businesses to survive (Landsperger et al., 2012). Despite this, the innovation network's transformative function cannot be disregarded due to its new ideas, which significantly impact the performance and success of businesses, particularly SMEs (Dedrick and Kraemer, 2015). Products in every industry or sector benefit from the circular sustainable models (Arfaoui et al., 2021). This research focuses on the organizational innovation of SMEs in the circular economy, which is not yet accessible in the literature.

It is important to note that small and medium-sized enterprises (SMEs) have a significant economic function and a significant part in protecting the environment because of their use of intensive natural resources and the trash they generate.

Researchers believe that a transition to a circular economy in small and medium-sized businesses (SMEs) might substantially benefit the environment, society, and economy. This shift would likely occur more quickly if creative circular economy activities were implemented (Domenech and Bahn-Walkowiak, 2019). Small and medium-sized businesses have a significant problem in organizational innovation. The transformational model presents an enormous opportunity for small and medium-sized businesses (SMEs), but it also comes with significant challenges, the most significant of which are connected to successfully implementing cutting-edge technology (Tang, 1998). An in-depth investigation of the innovation network's function in achieving organizational innovativeness is thus required.

However, small and medium-sized enterprises (SMEs) need an innovation network to create novel ideas and knowledge for new products, which leads to organizational innovation and inexpensive innovation by using current resources. Innovation is a company's evolving dynamic capability that helps preserve competitive advantages by meeting the demands of its customers (Amidon, 2007). In today's dynamic business world, a company's ability to adapt quickly to emergent business developments is critical to its success (Edquist, 2010). To this end, academics are always looking for and identifying ways to improve the innovation capacity of small and medium-sized enterprises. However, there is no evidence in the literature to support the idea that innovation networks, organizational preparedness, and frugal innovation may help an organization become more inventive.

SME innovativeness is difficult. However, the rise of frugal innovation provides particular chances that rely on the network of prospective SMEs (Levänen et al., 2022). Entrepreneurs that have access to an innovation network are more likely to develop innovative products and services, as well as a better understanding of their company processes. Many elements, such as explorative networks, organizational preparedness, and frugal innovation, have still to be examined in organizational innovation in the circular economy (Bedi and Vij, 2016). Prior studies investigated the requirements that might speed up organizational innovation, but they scarcely shed light on the function of organizational innovation and its primary drivers in small and medium-sized enterprises (SMEs). According to the present research, SMEs in the circular economy environment have much room for improvement when it comes to innovation. This approach to study is novel and narrative. Organizational preparedness was a moderator in our study of the relationship between the innovation network and an organization's ability to innovate, while frugal innovation served as a mediator between the two. Small and medium-sized enterprises (SMEs) now need innovation networks to make the most of available resources in a changing environment. To better understand how small and medium-sized businesses may be more inventive, researchers looked at their innovation networks and their impact on larger organizations. The innovation network is critical to a company's ability to operate at a high level. In order to boost an organization's innovativeness, not only do you need an innovation network, but you also need to generate new ideas and knowledge via inexpensive innovation (Sommer et al., 2017).

As a result of this research, we want to shed light on how the innovation network affects organizational innovativeness and how frugal innovation and organizational innovativeness might benefit from this network. The present research experimentally examines their impacts and results on organizational innovation. As a result, our research intends to speed up and enhance the organizational innovation of small and medium-sized enterprises.

Economic and environmental turmoil have significantly impacted the circular economy's corporate strategies and innovation processes in recent years (Amidon, 2007). Frugal innovation arose in circular economies, where resources drove businesses to rethink their

innovation tactics, gaining much attention from practitioners and researchers. Consequently, companies can meet their consumers' fundamental requirements at a lower cost by implementing frugal innovation, which introduces ideas that aid in the use of existing resources. SMEs in the circular economy, where clients are looking for low-cost items, are best served by frugal innovation. As a result, firms such as SMEs in the circular economy have a growing need to investigate the results of frugal innovation. This study considers this research gap and indicates that the innovation network is the essential predictor of frugal innovation and organizational innovativeness as a result. Earlier research has shown that growing an organization's capacity for innovation relies heavily on frugal innovation. Product and service development may be more cost-effective than using current assets to create new ones (Prabhu, 2017). Frugal innovation, vital to small and medium-sized enterprises' organizational innovation, is a mediating mechanism in this research. As a result, it reveals that organizational readiness allows SMEs to adapt and adopt the most recent technology advances for increased innovative activities inside a company (Lehman et al., 2002). This research examines organizational preparedness as a mediator between innovation networks and organizational innovativeness.

This paper aims to provide an organizational innovation paradigm for SMEs in the circular economy. An investigation of the impact of innovation networks on a company's ability to innovate is being conducted right now. In addition, this study examines the function of frugal innovation and organizational preparedness in mediating between the innovation network and innovation's ability to adapt. The following are the sub-sections of the present study's objectives. This section has two parts: the literature review and the methodology. The results of the hypotheses are presented in Section 4, and a conclusion is provided in Section 4.

Literature Review

Organizational innovativeness and innovation network

Innovative product design, increased demand for their goods, and increased organizational innovativeness are all facilitated by innovation networks (Sommer et al., 2017). In order to effectively enter a new market, companies use innovation networks to increase their relationships with suppliers, partners, and rivals. In order to keep up with the current technological advancements, the company employs a variety of novel tactics (Wang et al., 2016). By exchanging less helpful information, innovation networks and advanced knowledge and information may achieve organizational innovativeness via the innovative development of various goods inside the firm (Leenders et al., 2007). One of the most important benefits of an innovation network is that it enables companies to migrate from internal to external innovation strategies (Kamaluddin et al., 2016). These creative concepts are essential to building a new product, attracting consumers, meeting their needs, and increasing organizational innovation (Blichfeldt and Knudsen, 2017). Because of this, an innovation network may favor an organization's ability to be creative. A company's ability to innovate is enhanced when new and current resources from inside and outside the business are pooled to form an innovation network (Farnese and Livi, 2016). Because they understand that new, creative information and ideas emerge from suppliers, partners, and customers (Leenders et al., 2007), innovation networks emphasize knowledge activities inside and outside the company. To create the newest original product from various sources, organizational innovativeness is a demanding undertaking that requires work and understanding (Hite et al., 2006). Innovation networks know possible prospects and values and which elements/knowledge can be combined/exchanged for inventive product development, enhancing the firm's organizational innovation capacity (Blichfeldt and Knudsen, 2017). As a result of new applied knowledge, an

innovation network may achieve a high level of organizational innovation via new ideas and new products (Wang et al., 2016). By providing the most current solutions for organizational innovation, an innovation network helps to introduce new products quickly (Cheney et al., 1986). As a result, we asserted that a company's ability to achieve organizational innovativeness via new product design methods relies on the existence of an innovation network.

H1: Organizational innovativeness is predicted by Innovation network

Frugal Innovation

An innovation network is the most reliable source of new ideas and information for external stakeholders. A firm's competitive, consumer, and market intelligence helps it develop new approaches to creating new goods and processes (Parida et al., 2017a). Frugal innovation, on the other hand, is a method that enables companies to make use of their existing knowledge and resources for new activities that lead to organizational innovation (Nassani et al., 2022). For example, firms use innovation networks to gather information on external stakeholders such as rivals and suppliers. Previous studies have shown that innovation networks help companies take the newest activities, which boosts the business's innovativeness as a whole. According to this study's findings, frugal innovation serves as a mediator between innovation networks and organizational innovativeness. With the help of an innovation network, a business may gather the data and concepts it needs to succeed in innovation (Parida et al., 2017b). The frugal innovation mechanism allows companies to utilize readily available information and expertise that third parties have recognized to stimulate creativity inside the business (Mvulirwenande and Wehn, 2020). This cost decrease is made possible by the inventive ideas of the innovation network, which are part of the frugal innovation process (Albert, 2019). The innovation network may obtain multiple ideas and information from other sources. Frugal innovation is encouraged through the innovation network, which raises the inventiveness of the firm as a whole (Piazza et al., 2019). In order to achieve organizational innovativeness, which comes with the ongoing efforts engaged in innovation-related activities (Klimas, 2014), organizations need an innovation network since it allows them to employ their current resources in innovative ways. Innovative goods and services are created using sophisticated knowledge and current company resources and skills cost-effectively (Soni and Krishnan, 2014). According to previous research, a flexible innovation network architecture supports the quick formulation of new activities utilizing existing resources and skills (Lawson and Samson, 2001). Using a frugal innovation mechanism that aids in utilizing readily available resources for innovation and innovation networks provides companies with various innovative strategies that help them meet the potential demand of their customers while also keeping costs down (Piazza et al., 2019).

H2: Frugal innovation is a mediator between the innovation network and the relationship between organizational innovativeness

Organizational readiness

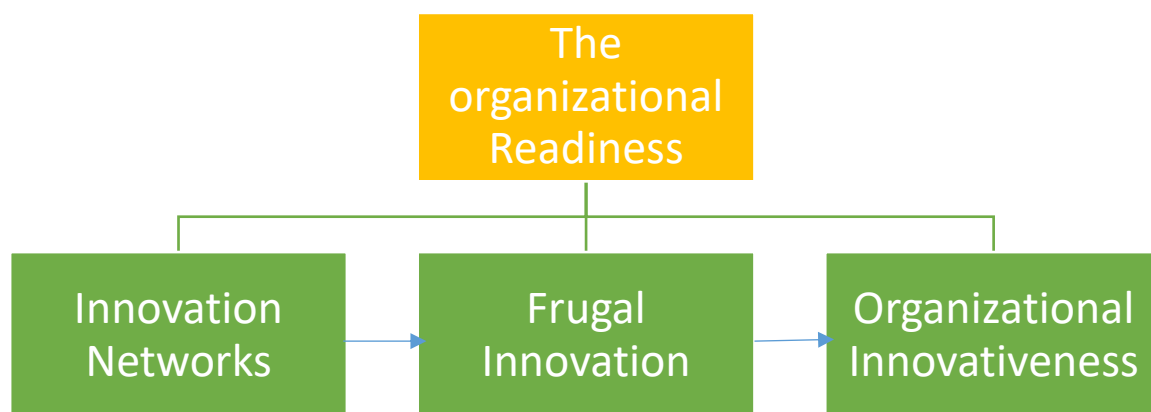
Rapid alterations to the external environment are posing a challenge to businesses. The capacity of a company to organize and utilize readily available resources to implement the newest creative development is referred to as "organizational readiness" (Kollmann* et al., 2009). The degree to which employees in an organization are prepared to accept and execute quickly evolving changes. When innovation networks establish future innovation strategies, organizational readiness is a vital component. It allows companies to employ current resources to execute the newest developments in innovation activities that lead to organizational innovativeness (Nordin, 2012). According to real-world studies, the innovation network has a

vital influence on a company's organizational preparedness (Farnese and Livi, 2016). As a result of the execution of innovation activities, the innovation network has a binding influence on the organization's innovativeness. This is why we chose organizational preparedness as a moderator between the relationship between the innovation network and the organization's innovativeness. When an innovation network and organizational readiness operate together, organizations may attain their intended level of innovativeness. Readiness plays a vital part in this capacity to respond to essential changes quickly. As a result, rather than interfering, this research emphasizes modulating the function of preparation. The relationship between creative networks and organizational innovation is accelerated by organizational preparedness. The most recent technological advancements and the implementation of new ideas provided by their innovation network are used to kick start innovation activities (Lehman et al., 2002). When companies can adapt, i.e., organizational preparedness, this method will be quicker and more convenient. Because organizational preparedness is a moderator, it cannot be neglected in the interaction between innovation networks and organizational innovation.

A company's ability to generate creative goods is greatly enhanced by joining an innovation network. The capacity of a corporation to use existing resources to execute the most recent innovation activities provides significant competitive advantages and boosts organizational innovation (Hameed et al., 2021). Organizational preparedness supports a strong innovation network to obtain creative ideas and knowledge from stakeholder groups. These ideas and knowledge aid the effective execution of innovation activities. As a result of organizational preparedness, established techniques for achieving ideas and information that lead to organizational innovation may be changed and improved (Trott et al., 2018).

On the other hand, it is believed that a greater degree of organizational preparedness might increase the link between innovation networks and organizational innovativeness for companies. Organizational preparedness and a strong innovation network are critical in today's rapidly changing business environment. It positively impacts company innovation by serving as a stimulant (Alsaad et al., 2014).

H3: Organizational readiness work as a moderator between organizational innovativeness link and innovation network.



Methodology

Quantitative research is the focus of this study. A cross-sectional approach was employed to gather data. This study, conducted through surveys and interviews, focuses on Pakistan's small and medium-sized enterprises (SMEs). Using just a few representative samples, the current study's findings should be applied to the whole population.

Data Collection

Many developing nations' economies are boosted by small and medium-sized enterprises (SMEs). SMEDA provided information about Pakistani small and medium-sized enterprises (SMEs). Participants, such as owners, managers, and workers of chosen small and medium-sized businesses (SMEs), were sent questionnaires via e-mail and in hard copy, with the assistance of research colleagues. It took us two months to get 544 replies out of 715, but only 442 are usable for further research. As a result, the return rate is 62.07%, and 270 orders were returned as unfulfilled. Participants received their questionnaires after being thoroughly scrutinized by a panel of three IT and academic professionals to ensure they were free of errors. Two parts were included in a questionnaire. Section 1 focuses on demographic characteristics, including age, education, and experience, while Section 2 focuses on each of these variables in further detail.

In Appendix A, you can find the questionnaire.

Instrument for Measurement

Five-point Likert scales, ranging from 1 (not at all) to 5(great), were used to measure each variable, such as the innovation network (an independent variable), frugal innovation (a mediating construct), organizational readiness (a moderating variable), and organizational innovativeness (a dependent variable).

Innovative network

A five-item scale developed by the innovation network is used to evaluate its performance.

Frugal Innovation

Frugal innovation may be measured using an eight-item scale developed by (Rossetto and Borini, 2017) and previously used by(Haffar et al., 2021).

Organizational Readiness

The six-item measures were derived from (Claiborne et al., 2013) to evaluate organizational preparedness.

Organizational Innovativeness

A four-item scale modified from(Hsu, 2007) assesses organizational innovation.

Control Variables

Organizational innovation, frugal innovation, organizational preparedness for innovation, and the innovation network may all be measured by controlling for the survey respondents' education, experience, and age.

Analysis of Results

Frugal innovation, organizational preparedness, and organizational innovativeness were all investigated using a confirmatory factor analysis (CFA). Initially, we set up a

hypothesis to test the optimum model. Three other models were found unfit for the data and were discarded in favor of our four-factor model. The total model fitness was shown by the fit keys $\chi^2 = 1065.42$, CFI = 0.92, GFI = 0.93, and RMSEA = 0.046. Model fitness was confirmed, according to Anderson and Gerbing.

Reliability and Validating

This research used SPSS 18.0 and structural equational modeling. Convergent validity findings are averaged, and Cronbach's alpha is shown in Table 1. CR and AVE were higher than the cutoff limits (i.e., CR was more significant than 0.70) in Table 1, and CR was higher than the average variance retrieved (AVE was more significant than 0.50). The alpha for Cronbach's alpha was over 0.60.

The results of correlation, mean, and standard deviation are shown in Table 2. The VIF scores verified that there was no issue with multi-Collinearity were less than the threshold of 10.0.

Test of Hypothesis

Structural equation modeling has been used to determine whether or not the hypothesis may be accepted or rejected. It is shown in Table 3 that innovation networks have a positive correlation with organizational innovativeness ($= .32^{**}$, $P = 0.001$). As a result, H1 was approved.

Frugal innovation has an indirect impact on organizational innovativeness, as seen in Table 4. Researchers found a link between low-cost innovation and higher returns on investment (Beta = 0.16, Lower = 0.1230 to Upper = 0.2860). It has been shown that FI mediates the IN-OI relationship; therefore, H2 has been demonstrated to be correct.

Organizational readiness (OR) moderates the direct relationship between IN and OI, as seen in Table 5. Thus, OR is a strong moderator of the IN-OI association, with a p-value of 0.01 suggesting that OR is an essential player in this interaction.

Discussion

The primary goal of this study was to show how the innovation network contributes to the growth of organizational innovation via frugal innovation. We connected the innovation network with frugal innovation and organizational innovativeness to achieve the study's aim. It has been investigated in detail how innovation networks and organizational innovativeness are linked through direct connections and how frugal innovation acts as a mediator between the two.

Our research is based on the testing of three distinct hypotheses. In light of H1, we propose that the existence of an innovation network is directly linked to an organization's capacity for innovation. Research shows that the innovation network has mastered the art of acquiring the resources and expertise necessary to develop new ideas into working products, rising demand for goods, and promoting organizational creativity (Sommer et al., 2017). An innovation network helps a company grow its network of suppliers, partners, and rivals, allowing it to enter new markets more easily. Innovativeness and product development are bolstered as a result of new approaches used by the company (Wang et al., 2016). With increased knowledge and information and innovation networks, companies may achieve organizational innovation via innovative product manufacturing through less effective

knowledge sharing (Leenders et al., 2007). It is consistent with previous findings that innovation networks have a favorable influence on organizational innovation.

Regarding H2, it was shown that the innovation network accurately predicted an organization's ability to innovate on a budget. The innovation network is a foundation for frugal innovation and a source of organizational inventiveness since it connects many stakeholders in the innovation process.

The findings showed that enterprises get the most up-to-date information about rivals, consumers, and the market, making it easier for them to develop new goods and procedures (Parida et al., 2017b). As an alternative, frugal innovation is a technique that enables companies to use their existing knowledge and resources for creative activities that lead to organizational innovation (Nassani et al., 2022). Companies can use innovation networks to include information about their external stakeholders, rivals, and suppliers. Previous studies have shown that innovation networks help companies take the newest activities, enhancing the business's innovativeness. According to this study's findings, frugal innovation serves as a mediator between innovation networks and organizational innovativeness. An organization's innovation activities are solid via an innovation network (Parida et al., 2017a). The frugal innovation mechanism allows companies to utilize readily available information and expertise that third parties have recognized to stimulate creativity inside the business (Mvulirwenande and Wehn, 2020). The H2 has been verified.

A final moderating variable was included in H3 since innovation networks are essential to a company's innovation ability (Piazza et al., 2019). We utilized organizational preparedness as this moderating variable. It is the element that drives and enhances the company's ability to innovate. By embracing the newest developing innovations and integrating inventive ideas from its innovation network, it may quickly grow its innovation operations if the business is ready. A company's ability to take advantage of the current potential for innovation in the circular economy is enhanced by its organizational preparedness. The importance of the innovation network in a company's ability to adapt to change has been shown in practice (Farnese and Livi, 2016). In H1, we conducted an empirical investigation into the link between an organization's ability to innovate and its network of innovators. The findings were encouraging. Then, as a moderator in their association, we utilized organizational preparedness to deepen their relationships in H3. It also yields only favorable consequences in every instance. The findings revealed that businesses are having trouble adapting to the fast-growing environment. When a company can organize and use readily available resources to implement the most recent innovative change, it is said to have achieved organizational readiness (Kollmann* et al., 2009; Pirtea et al., 2021). It refers to the level at which an organization's members are psychologically, physically, and behaviorally prepared to accept and implement the rapidly growing changes. Developing future innovation plans developed by innovation networks, and enabling organizations to employ current resources to adopt the newest developments in innovation activities that lead to organizational innovativeness, is a vital part of organizational readiness. In order to be successful, a company's creative quality improvement network and adaptability are critical factors (Panait and Gabriel, 2015).

Organizational innovativeness is regulated by organizational preparedness, as shown by H3's findings. Frugal innovation, organizational preparedness, and the innovation network all play essential roles in this research, which adds to the growing body of information regarding how organizations become more creative from the inside out.

Theoretical Contribution

In the following ways, this research contributes to literary theory: Due to this research, SMEs may get a better grasp of the innovation network.

In this research, we looked at the role of innovation networks in SMEs functioning in Pakistan's circular economy in determining cost-effective innovation and organizational innovativeness. Only a few academics have examined these correlations in the SME environment experimentally.

Secondly, this study provides an organizational innovation paradigm for small and medium-sized enterprises. These included elements, such as innovation network, frugal innovation, and organizational preparedness for innovation, are outlined in the organizational innovativeness model (OI). This research adds to the existing body of knowledge by analyzing how the innovation network aids SMEs in obtaining critical data and knowledge about innovation activities via readily accessible resources.

Third, the data demonstrates that innovation networks mediate frugal innovation development. Organizational innovation is made possible by efficiently using readily available resources, and frugality is vital to this strategy.

This study also focuses on the function of organizational preparedness as a mediator between innovation networks and organizational innovation. The capacity of a company to sustain and start superior inventive change and ideas from the innovation network leads to organizational innovation.

Practical Implications

The findings of this study have important significance for Pakistan's circular economy policymaking, small business management, and administration. For small and medium-sized enterprises (SMEs), the present research recommends developing an innovation network that emphasizes the mobilization of existing resources. Organizational innovation may be achieved when the business innovation network has well-built frugal innovation techniques to employ existing resources.

Because an innovation network is not adequate to create organizational innovation, this research focused on the mediating function of frugal innovation, which is necessary for the success of organizational innovation. In order to attain organizational innovativeness with existing resources, managers of SMEs must implement frugal innovation using innovation network techniques.

According to this study, organizational readiness is a significant factor in the innovation network's effectiveness and organizational innovativeness. It seems challenging to reap the advantages of an innovation network if a firm lacks organizational preparedness.

Future research directions and limitations

There are various flaws in this study that might be worked out in future studies. Future research may be able to extrapolate the findings of this study to other economies because of the present study's focus on SMEs in Pakistan's circular economy. Future research may look at other sectors besides SMEs for the study components. To better understand the research components, the qualitative analysis may be helpful since we employed quantitative methodologies to evaluate the critical influence of innovation networks on frugal innovation and organizational innovativeness. Cross-sectional methods were employed to test hypotheses.

However, a longitudinal approach may be utilized further to understand the innovation network's impact on organizational innovation. Using organizational preparedness as a mediator in the link between the innovation network and organizational innovativeness might be explored in future research.

Conclusion

An organization's ability to think beyond the box is critical to its success. A company with a substantial innovation network can more easily grow its relationships with suppliers, partners, and rivals, making it easier to get a foothold in a new market. The company may also use this network to create new products and increase its level of innovation. This study empirically examines the influence of Pakistani SMEs' innovation networks in attaining organizational innovation.

According to the findings, creative networks are a valuable source of new ideas and tactics for fostering an innovative work environment. Furthermore, the significance of organizational preparedness in the relationship between the innovation network and organizational innovativeness is also examined in the study of frugal innovation.

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APPENDIX A

Questionnaire

In this questionnaire we denote as, Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly disagree (SD)

Variable: *Innovation Network*

Statement	SA	A	N	D	SD
Our company is responsible for market changes.					
Our company can make novel products faster than competitors.					
Our company's innovation network can frequently launch and introduce the latest products to emerging markets.					
Our company's innovation network has the ability to fulfil the demands of the customer.					
Our company's innovation network can support and introduce innovative business opportunities					

Variable: *Frugal Innovation*

Statement	SA	A	N	D	SD
Our company frequently Paying attention to functionality					
Our company always seeks out new solutions					
Our company enhances the durability of existing products and services.					
Our company offers suitable products at a reasonable price.					
Our company finds out new ways for reduction of cost in manufacturing processes.					
Our company adopts the latest strategies for the innovative product and services prices.					
Our company seeks out efficient solutions to meet customers' needs at a reasonable price.					
Our company increases and improves partnership with other firms.					

Variable: *Organizational readiness*

Statement	SA	A	N	D	SD
Some members of the company resist every kind of change.					
Particular members appreciate changes as they improve and increase outcomes.					
Some firm members slowly adopt changes.					
Some firms can modify procedures and policies to fulfil new conditions.					
Necessary changes should be implemented by management through a clear plan.					
Most staff members are ready to use new ideas.					

Variable: *Organizational Innovativeness*

Statement	SA	A	N	D	SD
The level at which the firm is responsible for the change in the market.					
The ability of the firm to design innovative products and services.					
The level of knowledge activities which encourage innovation in firm products.					
The level of firm resources allocated for designing innovation strategies that are directed toward innovativeness.					