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The effectiveness of crisis management in encouraging technical innovation among medium and small companies in the Kingdom of Saudi Arabia

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Abstract

The major issue for doing this research is because Saudi culture lacks a strong opinion of social entrepreneurship as it's mostly associated with social accountability and voluntary efforts. Underpinning the same, this study was aimed to analyse what is the effectiveness of crisis management in encouraging technical innovation among medium and small companies in the Kingdom of Saudi Arabia. From the analysis of the study, it can be concluded that the firm of Saudi Arabia is not fully considering the crisis management for its operation. Though it is a vital factor to be considered for the day-to-day business in the present situation where uncertainty is high, however, lack of motivation to incorporate crisis management has been evident. On the other hand, innovation has been focused moderately; however, it is not up to the benchmark. Moreover, there has been lack of practice to consider crisis management as a tool to generate innovation as the firms faces no competition in the international market where it operates.

Keywords: The Kingdom of Saudi Arabia, Crisis Management, Innovation.

ملخص البحث

تكمن المشكلة الرئيسية لإجراء هذا البحث في أن الثقافة السعودية تفتقر إلى رأي قوي حول ريادة الأعمال الاجتماعية لأنها ترتبط في الغالب بالمساءلة الاجتماعية والجهود التطوعية. واستناداً إلى ذلك، هدفت هذه الدراسة إلى تحليل مدى فاعلية إدارة الأزمات في تشجيع الابتكار التقني بين الشركات المتوسطة والصغيرة في المملكة العربية السعودية. من تحليل الدراسة، يمكن الاستنتاج أن الشركة السعودية لا تفكر بشكل كامل في إدارة الأزمات لعملياتها. على الرغم من أنه عامل حيوي يجب أخذه في الاعتبار للأعمال اليومية في الوضع الحالي حيث ترتفع درجة عدم اليقين، إلا أن الافتقار إلى الحافز لدمج إدارة الأزمات كان واضحًا. من ناحية أخرى، تم التركيز على الابتكار بشكل معتدل؛ ومع ذلك، فإنه لا يصل إلى المعيار. علاوة على ذلك، كان هناك نقص في الممارسة للنظر في إدارة الأزمات كأداة لتوليد الابتكار حيث لا تواجه الشركات أي منافسة في السوق الدولية التي تعمل فيها.

الكلمات المفتاحية: المملكة العربية السعودية، إدارة الأزمات، الابتكار.

1. Introduction

At present, the pressing situation Saudi Arabia facing is unemployment crisis due to depletion of oil being a major resource for the economy (Bakry, Khalifa & Dabab, 2019). However, entrepreneurship, along with the innovation, is being introduced by the government in the strategic economic planning in order to tackle the situation. Entrepreneurship is construed as a significant aspect of financial growth and development of the region. Saudi Arabia is witnessing a gradual and complete change by various implementation plans that are set to create a strong economy based on a differentiated production base and an increase in competition. On the other hand, technology defines the development of the present business process with the data-driven approach that can reduce the cost of service while providing better service. The implementation of information and communication technology (ICT) has empowered SMEs to partake in the global business market.

At present, business evolution is reflected as an influential tool in both developed and emerging economies. Four major performance measures are used to judge business development like job creation opportunities, the shift of business from growth stage to the matured stage, business success in terms of the revenue made etc. SMEs provides owners with required skills, network and practices that are required to make their enterprise success and sustain through the crisis (Al-Mubaraki & Busler, 2015). Thus, evolution shows SMEs as an effective and innovative tool for economic growth.

2. Literature Review

2.1 Theoretical literature related to crisis management

2.1.1 The concept of crisis

According to Kurschus, Sarapovas and Pilinkiene (2017), crisis recognition in SMEs needs precise consideration of quantitative and qualitative measures that define the performance of SME and its business outlooks. Nevertheless, the means to identify any changes and their anticipated effect on the business aptitude to accomplish in the future are completely different and reliant on diverse techniques. The preciseness of SMEs crisis management is typically linked to the important impact of qualitative aspects associated with the quality of management, business setting, competitiveness and shareholders' part in the business. SMEs are normally viewed as a business with fewer competencies and more explicit business management that is somewhat linked to restricted financial resources, the higher impact of outside forces and less probability of sustaining crisis management with the available internal resources.

Šubrt (2020) represented that at a present crisis is specifically close to notions like risk, disaster and failure that are used for expressing apprehension in some cases. Crisis management is identifying risks to a business and its stakeholders and the process that can be applied by SMEs to overcome or cope with the changes to conduct business. Thus, many businesses create a crisis management plan that helps to bring down the risks or ambiguity, related to the crisis. The crisis is considered to be pessimistic changes in the safety, financial, political or environmental dealings, particularly when they happen suddenly with minimum or no warning indications. There are three forms of crisis like an instant, developing in which the activities can be predicted and also avoided and last is sustained is where it may last for long and drain the assets of a business. For example, in the 2008 financial crisis where major banks in the US like Citibank and JP Morgan Chase & Co. started showing an indication of recovery; however, their reputations taking a severe hit.

2.1.2 The causes of the crisis

As per Stockhammer (2015), the financial factors are one of the crucial causes for a crisis to arise; however, other socio-economic aspects cannot be ignored. For example, the increase in discrimination has been seen as an intense social change in all businesses across the globe. Thus, after the crisis, monetary policies have instantaneously dropped pays in real terms, and this has led to the outburst of international income disparity. An illustration of how the major oil crisis meant trouble for Saudi Arabia will clarify the causes of the crisis effectively. The enormous downfall in the world over demand and prices slowing from the COVID-19 pandemic has brought an instant of estimation for the Kingdom (Brew, 2020). This will need unparalleled action to tackle the situation without instigating a reflective economic burden or internal political unpredictability.

Furthermore, the pandemic aggravated an already unwelcoming position on oil markets where the estimation declined by 30% in the short run, and the country started to gear for some belt stiffening moment. The government is preparing to take extraordinary measures to bail out of the crisis like an increase in value-added tax (VAT). Thus, the tax programme has a substantial influence on the cost and capital flow since it disturbs finance requirements. Some other contributing factors for a crisis to occur are complete failure, unforeseen or overpowering human demeanour, lack of regulations or crisis like COVD pandemic. Thus, a pertinent lesson during a crisis is that the government and the financial institutions must not strive to steer the economy. On the contrary, let it be driven by investors, businesses and banks that respond to price indications and apparent risks.

2.1.3 Types and characteristics of crisis

SMEs play a vital part in the economic system of any developing or developed economy. Kozubíková et al. (2015) in their study found that the business settings are defined by the personal features and motives of individual entrepreneurs. Every business scenario is distinct in their randomness, complexity and changing necessities during the business practices. Despite every crisis being unique, there is also some common crisis like there be a physical danger that needs to be the priority of a business or a key employee may be absent. Hence, an incidence response plan offers clear guidelines for coping with such characteristics. Having a plan in place makes the business feel calm during crisis and also aid in reducing the impact on it. Three components normally signify main attributes to a crisis, namely, the threat to the business, the element of shock and a short decision time.

The major types of crisis begin with the financial crisis which every business experiences once or many times. This befalls when a business does not manage its funds cautiously and has taken too much external borrowings. This crisis occurs when the business incurs heavy losses over a period or due to the absence of accountability. According to Mithas and Rust (2016), information technology plans have an important role in moderating the link between technology investments and business performance. Normally, a technology crisis happens due to breakdowns in the technological tools and equipment that are used by the business. For example, if servers get overcrowded, this leads to the deletion of many important details is denoted as a technological crisis. Next is the crisis of malice that arises due to competition among businesses. Certain rivals take severe steps to damage the reputation of similar businesses for their success, for example, product tampering. Last is the natural crisis caused due by calamities like earthquakes or COVID-19 pandemic, and such a crisis is out of business control. The only possible step the management can take is to order for a temporary closure of business or evacuation.

2.1.4 Methods of dealing with crisis

As per Dahles and Susilowati (2015), the idea of crisis is used to outline a variety of actions that interrupt the operation of any business. These events can be categorised either as management failures or impulsive disaster occurrences. Firstly, once the crisis has taken place, the business is required to stress on control, separate the crisis and reduce the damage. For example, Saudi Arabia is going through a crisis of depletion of natural resources like oil due to the sudden downfall in oil prices. This crisis has a ripple effect on most of the businesses that are reliant on oil. Adequate time must be taken by the business along with the government support to assess the situation and take gradual steps to restore the business and start a clear plan. The key to this is to involve all the stakeholders that will help companies to decide and ideate better.

Once all the ideas are in place, it's time to refine the business structure to suit the current market situations. Similarly, communicating the change is vital for the business to progress so the employees are aware of what is expected from them, and they also learn to handle challenges. Diverse types of crisis impact business activities and management of crisis and taking ownership needs collaborated effort from all in terms of skills, expertise and abilities (Alharthi & Khalifa, 2019). Thus, a crisis management plan is a prevailing document that is required to be evaluated frequently for any changes or updates.

2.1.5 Crisis management and ways to succeed

As per Bowers, Hall and Srinivasan (2017) organisations that are faced with crisis mostly tend to depend on a leader that guides them through this situation. Crisis for SMEs is devastating in contrast to large businesses as they are not well equipped to brace the situation. However, the following steps can ensure that SMEs also emerge successfully from the situation:

Evaluate the situation accurately – Accurately assessing the situation will permit the business to ascertain the root cause of the problem and draw firm conclusions. Identifying and describing the crisis is already half well crossed. A sound leader remaining calm will motivate the employees to be confident in facing the challenge.

Acclimatise, refine and overcome – Evaluating the viability of the crisis management plan documented for SMEs should map out some fundamental targets and indicators that permit to measure the progress. If the required results are not achieved during the progress, then changes are to be made in the strategy.

As per Williams et al. (2017) crises are alleged to signify an opportunity for leaders to communicate with stakeholders, exhibit leadership competence and engage in positive behaviour. The most valuable process any organisation can have is to form a crisis management team. Also, when communicating the crisis to the external environment, it should not be one-way, and businesses must pay attention to what customers and other stakeholders feel. This perspective is valuable for a business to change and act accordingly. Likewise, good companies permit the crisis to be a facilitator for optimistic operational transformation. The companies show a willingness to learn from their experience and not repeat and worsen the situation. Thus, strengthening relationships with customers and employees and optimistic connections between sales and other departments will help the business well into the future.

2.2 Theoretical literature related to technical innovation

2.2.1 The concept of technical innovation

According to Yusuf and Atassi (2016), Saudi Arabia's mission to expand its economy, which was completely dependent on natural resources into developing a knowledge-related economy and enhancing human capital through innovation. The motivation for such expansion relies on the necessity to improve human capital and encourage innovation and entrepreneurship. Currently, the objective of Saudi Arabia is to change the region into an international innovation hub in preparation for the subsequent reduction of natural resources like oil. However, the region is still behind other economies in terms of innovation and leadership, despite many people acquiring an international degree in the country. For this purpose, many universities can support by promoting a culture of innovation and entrepreneurship in a region by offering useful infrastructure and resources.

As per Albar and Hoque (2019), small and medium enterprises (SMEs) play a vital role in the national economy of many growing countries like Saudi Arabia. The acceptance of information and communication technology (ICT) has empowered local SMEs to partake in the global market. The main reason for choosing ICT by SMEs is to reduce costs and improve the efficiency of work. ICT helps SMEs to improve their technical abilities, reduce transaction expenses and shift the production function. The Saudi Arabia government offers widespread assistance and has invested in sustained development in the ICT infrastructure. Thus, SMEs need to deploy ICT strategically inside their business that will enable them to attain maximum benefits.

2.2.2 Characteristics of technical innovation

As per Koren and Palcic (2015) tough competition, difficult economic situations in both the local and global markets are turning to be constants for business. With fast technological changes and international rivalry, the success of many organisations has become gradually reliant on their aptitude to introduce innovative products in the market. A relative benefit measures how enhanced innovation is over a contending choice of a product. Prospects need to witness how innovation will improve their present scenario. For example, improved services, increased customisation, consistent quality, cost-effective and so on. When computers were introduced, people were liberated from typewriters, and here the relative benefit was evident. Moreover, if a relative benefit is not intrinsic to the product designed that this is not an innovation. The team must be able to recognise the probable benefit the product has in the planning stage. For example, if the product is claimed to be cost-effective than the rivals, there should be evidence to prove the same.

Huenteler et al. (2016) stated that technological transformation is the most crucial and the least unspoken aspect that drives the future cost of climate change mitigation, especially in the energy sector. Furthermore, compatibility is important where it denotes that innovation must be able to associate with a user's lives. For example, Apple's iPad has a high level of compatibility with users' lives when it was introduced. Lastly, observation is to what extent the outcomes or benefits of using a technical innovation are noticeable to probable adopters is important. Thus, the technology uses and creates technical knowledge, and this is validated by groups when it involves the successful development of technological results.

2.2.3 Advantages of technical innovation

According to Bouncken et al. (2018), a collaboration between rivals is a new strategy for the creation of new product development (NPD). Collaboration helps the development of new products by using joint market and technical knowledge that results in efficient innovation generation and dissemination. Technological innovation surges productivity and introduces new and better products and services that enhance customers' total standard of living. Even though the benefits of innovation take time to happen, they mostly tend to benefit the entire population. Moreover, technical innovation may lead to short-term disruptions where some existing businesses may lose, or people may lose jobs. The other major benefit of technology is the ability to assist SMEs to compete on the international platform. For example, the advent of the internet has permitted small entrepreneurs to showcase their products and services to prospects across the globe by creating a website, social media or using an e-commerce portal like Amazon.

The interaction between a company's competencies enables it to be more ambidextrous, which helps them attain higher financial performance (Sok, O'cass & Miles, 2016). This competence, when applied in innovation can help SMEs to keep the cost lower, for example, the use of automation can decrease the reliance of small business manufacturers on human capital to perform the same task. Thus, the business tends to reduce employee expenses like salary, incentives and invests the profits in deploying better technology to innovate effectively. Implementing continuous improvement processes like lean or six sigma can help the business to deliver with consistency and great speed, thus resulting in better customer satisfaction and retention rates.

2.2.4 Factors affecting technical innovation

According to Foroudi et al. (2016), the accomplishment of an innovative product is contingent on the managers' capability to match the value that a customer looks for from the service or product with the encouragement that the firm gets by introducing innovation. However, the absence of consumer or market-based information to managers and similarly, brand based information to consumers make a business less visible. Moreover, organisations are necessitated to offer favourable working conditions that consist of the support offered to people that would encourage them to use innovation effectively.

The absence of training, management support, work flexibility, participation in idea generation is some of the common factors that could affect the innovation ability in every employee. Similarly, external factors also act as an impediment for firms from innovating. The outside forces form challenges that managers are required to take account of while making strategic adoptions, for example, customers, suppliers, regulations, competitors and financial conditions of the region.

A public policy can impact the firm's activities in many ways like the tax regime affects the overall cost of the business activities. Bouazza, Ardjouman and Abada (2015), in their research, demonstrated that the absence of availability of external borrowings is construed as a key challenge for many SMEs to grow and apply the necessary technology to innovate, thus, leading to a high failure percentage. The reason is financial institutions apply caution when offering loans for SMEs and are they are charged with exorbitant interest rates. Thus, such limitations restrict SMEs to compete globally against other business and capture the market share.

2.3 The relationship of crisis management with technical innovation

Many corporate leaders tend to concentrate mainly on growing the business, conversely, fail to focus on eliminating potential drawbacks. Every company intends to grow but are uncertain of how to do it. The notion of handling the interrelationship between flexibility and governance in the workplace is not new. All businesses feel the burden to progress increasing attrition. Thus, the best way companies handle this pressure is through innovation. Nevertheless, the crisis does not get a similar level of appearance in the media mainly because this is less popular to discuss on. On the contrary, many organisations are taking note of crisis like global warming, resource shortage and economic inter-reliance. Despite all this attention, however, there exists still much uncertainty around the complexities of making the change in discernment and behaviour that innovation needs.

Altındağ and Kösedağı (2015), in their study, demonstrated that as firms endure to exist in the present competitive world, it's necessary that they have a skilled workforce to handle challenges and also innovate effectively. Also, nurturing the success of a competent manager to the next level is dependent on the demonstrative skills apart from the reasoning aptitude. Crisis management is required if change management efforts flop. Thus, a crisis is considered the initial step in the business change management process that sets the requirement for a change.

2.4 Previous study analysis

2.4.1 Recent studies finding for a relationship of crisis management with technical innovation

As per Ponis and Ntalla (2016) natural calamities are unexpected occurrences, like floods, earthquakes and viruses that can bring about extreme threat areas and thus, major commotions and scarcities to supply chains for many businesses. For example, an earthquake can affect the routes or make some specific supply and demand locations unreachable. The present trend of the international supply chain has made companies even more unprotected and susceptible to natural adversities. On the contrary, technological tragedies denote failures of systems that are caused by humans like any infrastructure harm that disrupts the node of a specific supply chain. The insurance business faced many challenges like demographic changes, economic reforms, growing markets, advancement in technology and changing customer behaviours (Rajapathirana & Hui, 2018). All these had a subsequent impact on changing the effectiveness, productivity and design and structure of the business. Many think the insurance industry does not apply technology-based innovation, especially for crisis management. Thus, the industry has to respond to this with quick changes.

One of the technological innovations like social media permitted improved communication and partnership among many businesses through online channels (Reuter, Hughes & Kaufhold, 2018). People used this innovation to the best efforts when communicating disaster in different regions by posting pictures and videos that helped in information exchange globally, for example, the 2007 wildfire in the US until the recent Amazon and Australian forest fires that caused many species to live in danger. Another crisis that took centre stage was the Paris shootings in 2015 that studies the swiftness of news content and its authenticity through trusted online news channels.

2.4.2 Commenting on previous studies and their relationship to the current study

It can be stated that the current study affirms that there is a strong connect between crisis management and technical innovation with the above-quoted examples of crisis that was highlighted in the global platform using the latest technical innovation like the internet that offered the speed and veracity about the information shown. The earlier studies also support the interrelationship between crisis and technology innovation as many companies unlike earlier periods due to advancements in technology are taking note of many global aspects like climate change, environmental damage due to pollution etc. However, a crisis does not get the same media attention as an innovation of a new product or service. Nevertheless, with the advent of social media handles crisis management, emphasising has become a reality in the present times.

3. Methodology

3.1 Research type

As the research type, the researcher would consider the mixed method of analysis as it will enable the researcher to consider both qualitative and quantitative analysis. Through considering only qualitative analysis would produce outcome through a mechanical process, whereas, qualitative study alone can generate outcome through theoretical analysis considering human psychology of the respondents only.

3.2 Research method

As the method of research, the researchers have considered the deductive approach as it has allowed the researcher to perform data analysis considering the previous study while developing a hypothesis. The inductive approach can also be considered here; however, it would restrict the researcher to perform quantitative data analysis and hence, the deductive approach is justified one here.

3.3 Research philosophy

As the researcher approach, the researcher has considered the positivism approach, where the researcher relied on the analysis of the quantitative data with the statistical analysis approach. Other than this, interpretivism approach has not been considered as it would restrict the researcher to perform the quantitative data analysis.

3.4 Research approach

For the present study, the researcher has considered the methodological study approach, where a new process has been tried and tested. Through considering the methodological study approach, the researcher can analyse the effectiveness of crisis management in encouraging technical innovation among medium and small companies in the Kingdom of Saudi Arabia. Contrary to this, if the exploratory or explanatory or even the descriptive study approach has been considered, then it would not generate a justified outcome to answer the research question. For instance, through the analysis of the exploratory study, the researcher would be able to determine cause-effect, whereas, with the help of the explanatory study, the researcher would be able to justify the impact with the causes and lastly, with the descriptive study, the researcher would have been able to answer the question with description underpinning previous studies. Hence, considering the methodological approach is justified.

3.5 Data collection and sampling

As the collection method of the data, the researcher has considered the primary data collection. Through the close-ended semi-structured survey question, the researcher has collected data through an online platform (Google Form). Through the survey data has been collected by the researcher. The researcher has considered 104 responses from medium and small companies in the Kingdom of Saudi Arabia. The researcher has distributed the questionnaire into three sections. First is general information, second is the first dimension of research, where questions related to crisis management was present and lastly, in the third part of the questionnaire, the second dimension of research was present. In the second dimension, questions related to the innovation practice in the firm has been considered.

3.6 Data analysis

As the method of the data analysis, the researcher has considered the quantitative analysis. For the analysis, the researcher has considered the statistical analysis with Excel and SPSS. For the quantitative analysis, the researcher has considered descriptive and inferential analysis. For the quantitative analysis, the researcher has developed a compositive score of the first and second dimension. Then underpinning the dependent variable, descriptive, inferential and graphical analysis of the data has been done.

4. Data Analysis

This chapter consists of data analysis to support the study objectives. The analysis has been divided in three sections and each section was arranged as.

Section-1: Validity and Reliability

In this section the validity and reliability of tool was checked and discussed.

Section-II: Demographic Analysis

Descriptive analysis of the demographic aspects of respondents was given.

Section-III: Testing of Research Hypothesis

T-test and ANOVA were used to test the significant differences in gender perceptions and various professions people perceptions respectively.

Section-I: Validity and Reliability

Validity

The validity of research questionnaire has been tested by two approaches

Pilot testing.

At first stage of validity we have made pilot testing of our tool. The pilot testing was made by targeted respondents. The questionnaire was given to ten respondents selected at random from sampled population but these ten respondents were not from the final sample of 104 respondents. In pilot testing questionnaire was administered by the researcher. The respondents were asked to fill the questionnaire and report if they feel any difficulty regarding filling the questionnaire. During pilot testing the issues faced by respondents were noted. Under the light of addressed issues questionnaire was modified.

Subjective Approach

The questionnaire was given to the experienced field experts and research scholar to test the validity of questionnaire. After carefully examining the questionnaire, the experts had given the opinions and in the light of expert opinions the questionnaire was amended for final survey.

The research tool became best after increasing the validity by pilot testing and subjective approach and become ready for data collection.

Reliability

The reliability of research tool was tested after the collection of data. The reliability was tested by Cronbach's alpha statistics. This statistic was obtained by using statistical SPSS software. The value of Cronbach's alpha was fund 0.844 for our questionnaire. This value showed that our research questionnaire was highly reliable as the minimum acceptable limit of Cronbach's alpha is 0.70. The high value showed reliability of tool.

Table 4.1 Cronbach's alpha Statistic

Cronbach's Alpha	No. of Items
0.844	26

Section-II- Demographic Analysis

The descriptive analysis of respondent's demographic characteristics was given in this section. This section consisted of frequency tables and pie chart. Pie chart was used for the demographic characteristics having more than two categories. At the end, simple description was given about each demographic characteristic.

Academic Qualification

Table 4.2: Academic qualification of respondents

Academic Qualification	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor	39	37.5	37.5	37.5
Master	45	43.3	43.3	80.8
Doctorate	20	19.2	19.2	100.0
Total	104	100.0	100.0	

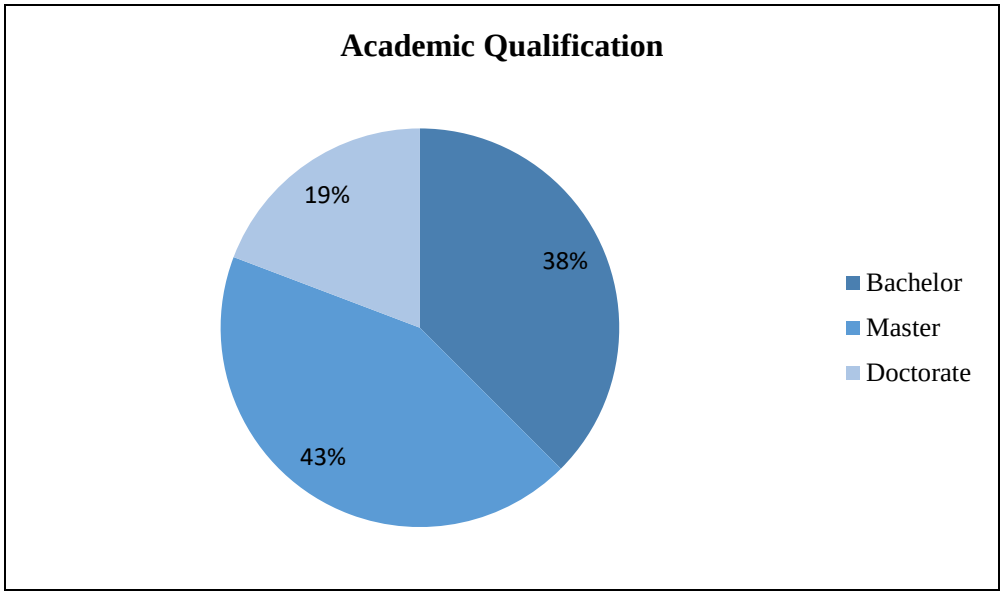

Figure 4.1: Pie chart of academic qualification

Findings:

In the study majority of respondents had bachelor or master degree. Almost 81 percent respondents had bachelor or master degree while only 19 percent respondents had doctoral degree.

Occupational Rank

Table 4.3: Occupational rank of respondents

Occupational Rank	Frequency	Percent	Valid Percent	Cumulative Percent
Employee	34	32.7	32.7	32.7
Department Manager	30	28.8	28.8	61.5
Department Head	19	18.3	18.3	79.8
Executive Director	21	20.2	20.2	100.0
Total	104	100.0	100.0	

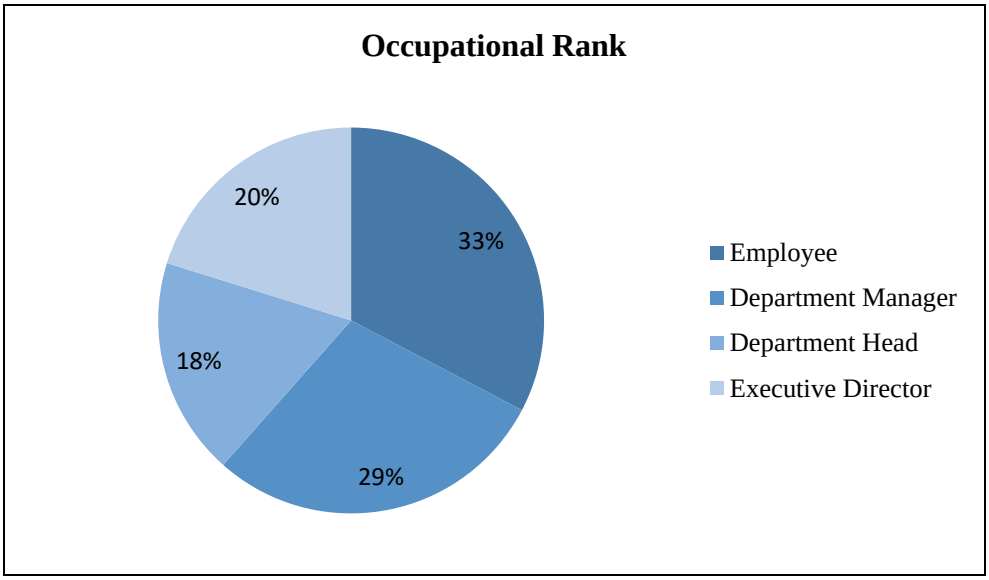

Figure 4.2: Pie chart of occupational rank

Findings:

The model category of occupational rank is non managerial employee. There were 33 percent employees while 29 percent respondents were department manager, 18 percent respondents were department heads and 20 percent respondents were executive directors.

Training Courses

Table 4.4: Training courses status of respondents

Training Courses	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 5 courses	42	40.4	40.4	40.4
From 5 - 10 Courses	40	38.5	38.5	78.8
More than 10 courses	22	21.2	21.2	100.0
Total	104	100.0	100.0	

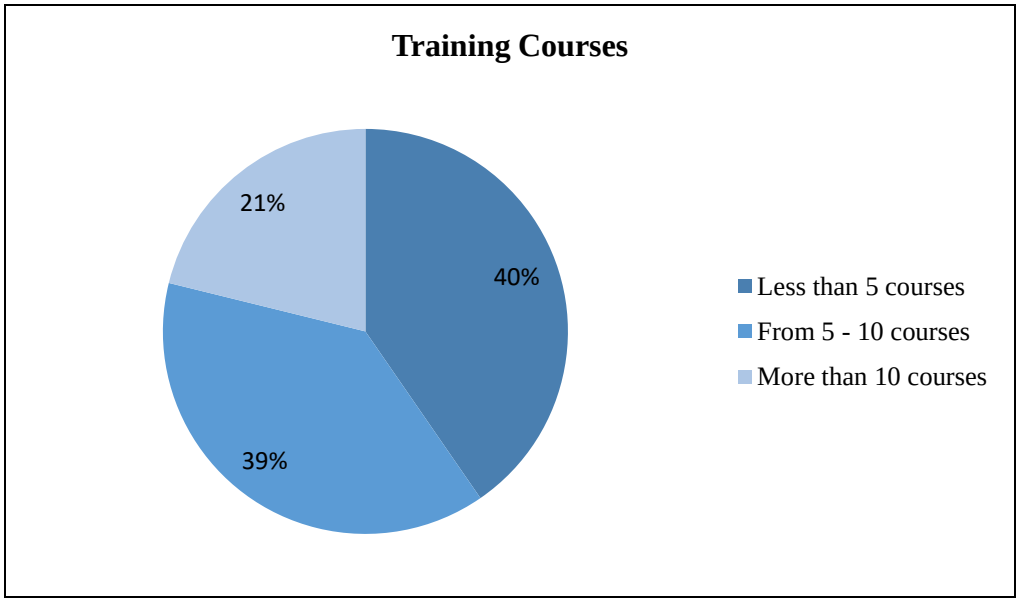

Figure 4.3: Pie chart of training courses

Findings:

In the study all respondents had got training courses on crises management. But the maximum respondents were those they had got less than five training courses and they were approximately 40 percent. While 39 percent respondents had got five to ten training courses and 21 percent respondents were those who had got more than ten training courses.

Experience

Table 4.5: Experience of respondents

Experience	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 5 years	34	32.7	32.7	32.7
From 6 to 10 years	49	47.1	47.1	79.8
More than 10 years	21	20.2	20.2	100.0
Total	104	100.0	100.0	

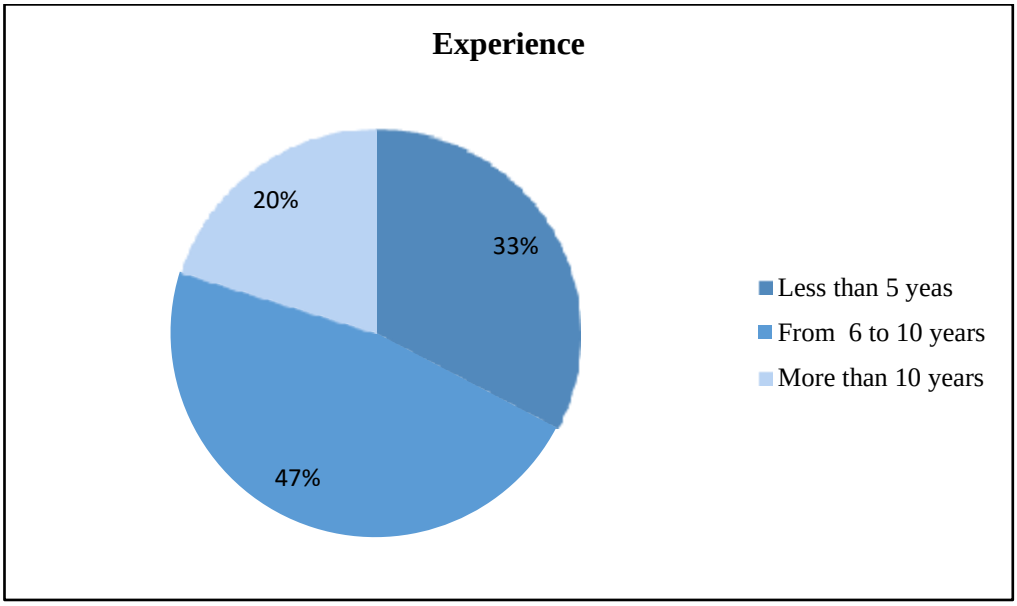

Figure 4.4: Pie chart of respondents' experience

Findings:

All respondents in the survey were experienced. Majority of respondents i.e. 47% had 6 to 10 year working experience. While the 20 percent respondents were highly experienced having more than 10 year experience. Only 33 percent respondents had less than 5 year experience.

Section-III: Testing of research hypothesis

To test the research hypotheses, the score against each dimension was calculated by transformation of variables in SPSS. For the first dimension related to crises management the score calculated was named as "Crises Management (CM)" and the second dimension related to technical innovation, the score calculated was named "Technical Innovation (TI)". Thirteen items were related to both dimensions. Each item was measured on five point rating scale from 'strongly disagree' to 'strongly agree'. To make analysis user friendly the five rating points were assigned codes as given in table 4.6

Table 4.6: Codes of responses

Response	Code
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly disagree	1

After assigning codes to responses the score of each new variable was calculated by summing up the responses. Each dimension variable was consisted of 13 items so the range of scores was 13 to 65. The score as calculated and analysis was performed. The analysis was consisted of descriptive statistics of each score and correlation and regression and ANOVA. The relationship between 'crises management' and 'technical innovation' was measured by Pearson correlation and was discussed its significance. The impact of 'crises management' on 'technical innovation' was analyzed by linear regression and the research hypothesis related to the relationship of these both dimensions was tested by ANOVA in addition to individual t-test of correlation coefficient and regression coefficients.

The analysis was done through SPSS and the results were given below along with discussion of each.

Descriptive Statistics:

The descriptive statistics consisted of mean score, minimum score, maximum score, standard error of mean, standard deviation of score, skewness and kurtosis statistics along with histogram. The descriptive statistics of 'crises management (CM)' score were given in table 4.7 and descriptive statistics of 'technical innovation (TI)' score were given in table 4.8 Figure 4.5 showed the histogram of 'crises management (CM)' score and figure 4.6 showed the histogram of 'technical innovation (TI)' score.

Table 4.7: Descriptive statistics of 'crises management'. (N= 104)

Minimum	Maximum	Mean	Std. Error	Std. Deviation	Skewness	Kurtosis
31	65	46.95	0.810	8.262	0.171	-0.203

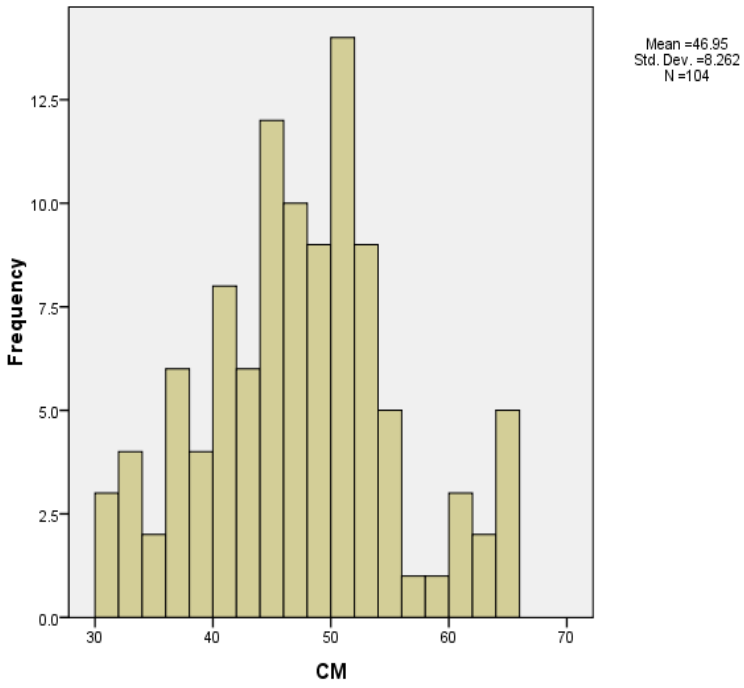

Figure 4.5: Histogram of crises management score

Table 4.8: Descriptive statistics of 'technical innovation'. (N=104)

Minimum	Maximum	Mean	Std. Error	Std. Deviation	Skewness	Kurtosis
25	65	46.12	0.728	7.422	0.484	1.053

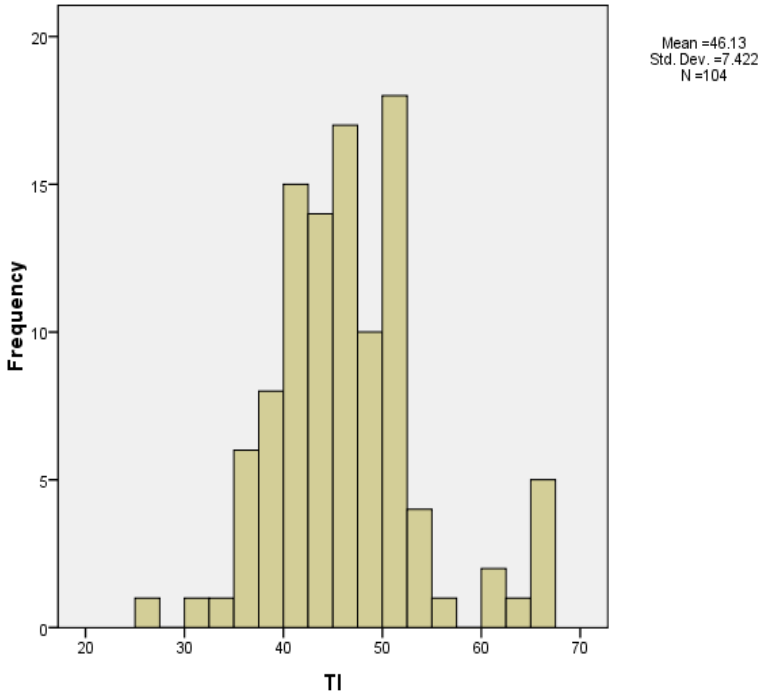

Figure 4.6: Histogram of technical innovation score

Findings:

The mean score of both variables are approximately equal and high. The high values of mean score showed the strength of responses about favor of crises management and technical innovation. The standard deviation and standard error of technical innovation variable was small as compared to crises management and showed the consistency of responses towards technical innovation. The skewness and kurtosis measures alongwith histograms for both variables showed that the distribution of both variables was approximately normal. The normality assumption of dependent variable provided the base of application of ordinary least square regression methodology (OLS).

Testing of research hypothesis

The research hypothesis about the relation and impact of crises management on technical innovation was tested by the significance of correlation and regression. in regression the significance was tested individually as well as overall.
The correlation statistics were given in table 4.9.

Table 4.9: Pearson correlation statistics

N	'r'	df	t-statistic	p-value
104	0.657	102	8.80	0.000

The regression output including model summary, coefficients and ANOVA table were given below in tables. Table 4.10 showed model summary, table 4.11 was about regression coefficients and table was about ANOVA.

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
	0.657[a]	0.432	0.426	5.621

Table 4.11: Coefficients

Variables	Coefficients	Std. Error	t-statistic	Sig.
Constant	18.407	3.196	5.760	0.000
CM	0.590	0.067	8.806	0.000

Table 4.12: ANOVA results or regression

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Regression	2450.331	1	2450.331	77.546	0.000
Residuals	3223.044	102	31.598		
Total	5673.375	103			

Findings:
The correlation statistics in table 4.9 showed strong positive relationship between the 'crises management' and 'technical innovation'. The t-test supported the hypothesis about the relationship of both these variables as the p-value of t-statistic is 0.000. The value of coefficient of determination (R^2) showed that 43.2% variation in technical innovation was explained by crises management. As a single factor of technical innovation it was satisfactory statistic. The individual coefficient of crises management was found significant with t-statistic i.e. 8.806 with significance value i.e. 0.000. This significant t-statistic also supported the research hypothesis about the relation and impact of crises management on technical

innovation. The value of coefficient of crises management i.e. 0.59 showed that change in crises management score by single point increased the technical innovation score by 0.59 points. This supported the hypothesis of crises management impact on technical innovation. The F-statistic in ANOVA table was found to be significant as its p-value was 0.000.

This significant statistic again supported the hypothesis about relation and impact of crises management on technical innovation. From the discussion of results it was observed that statistical analysis proved the research hypothesis of the present study.

5. Summary, Limitations, Conclusions and Recommendations

5.1 Summary

The objective of this study was to analyze the relationship between crises management and technical innovation in small medium enterprises (SME's) of Saudi Arabia. Along with this relationship additionally it was needed to analyze how crises management affect the technical innovation and what were the associated risks. Finally, the strategies were suggested to overcome the risks and challenges. To address the study objective, a structured questionnaire was developed to know the viewpoints of respondents related with SMEs in Saudi Arabia. The study topic and questionnaire were developed on the base of strong literature review by finding research gap and with the consultation of supervisor. The all-possible significant items relevant to the two dimensions i.e., crises management and technical innovation were developed and were included in the questionnaire in form of closed responses along with demographic section. The data related to developed questionnaire was collected from targeted respondents. The questionnaire was administrated online and data was collected. After the data collection from respondents, it was analyzed using statistical software SPSS. The study was both descriptive and inferential nature. In this sense our analysis is consisted the both descriptive and inferential aspects. The findings from analysis and conclusion had been given in the chapter.

The descriptive analysis was consisted of demographic section and descriptive statistics of two dimensions along with graphs. The descriptive analysis of demographic section was consisted of frequency tables, percentages, and pie charts. Inferential analysis was consisted of t-test and ANOVA to test the research hypothesis. The inferential analysis was consisted of Pearson correlation along with significance t test to test the existence of relationship between crises management and technical innovation. Regression analysis was conducted to test the impact of crises management on technical innovation along with the significant t-test of the regression coefficient. Additionally, ANOVA was used to test the overall significance of the relation and impact of crises management on technical innovation. At the end the conclusion was given on the basis of research findings and recommendations were made.

5.2 Limitations

The study was of specific nature so it was limited to some aspects. The major limitations of the study were defined and given as

1. The domain of study was the country Saudi Arabia.
2. The study was focused on crises management.
3. The study was confined to the small medium enterprises (SME's).

5.3 Conclusions

The research findings had been concluded in summarized form and subsequent conclusions had been given as

The data collected in the study was highly reliable as the reliability statistic was found to be 0.844. The study was mainly conducted on the people who were attached with small medium enterprises (SME's) in Saudi Arabia. The study was focused the current situation of Covd-19 crises management. Along with the crisis's management impact on technical innovation the new and novel nature challenges faced by SME's were observed and their corrective strategies were recommended.

It was concluded that distribution of both dimensions is approximately normal and is supportive for inferential analysis. The strong positive and highly significant relationship was observed between crises management and technical innovation. Crises management affected the technical innovation directly. The regression analysis showed that crises management has 43% contribution in explaining the technical innovation. This was found supportive figure for only one determinant of technical innovation. The crises management impact of technical innovation was observed 60% by the regression coefficient of crises management and this impact was found highly significant. In the end, using ANOVA over all the study objected was found to be supportive from the research data findings.

5.4 Recommendations

1. The study may be extended for all Saudi Arabia.
2. The study should be conducted for large scale firms also to see whether Covid-19 situation also affected these also.
3. The impact of crises management can be analyzed other dimensions also like growth, survival etc.
4. Policies should be developed to address the risks and challenges highlighted in the study.
5. Further researchers should be encouraged to work on the Covid-19 situation crises management as it could be alarming challenge in future also.

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