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THE MEDIATING EFFECT OF DISASTER RECOVERY PLAN ON THE RELATIONSHIP BETWEEN TECHNOLOGY, ORGANIZATION, ENVIRONMENT AND BUSINESS CONTINUITY MANAGEMENT

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Abstract

The aim of this study is to examine the mediating effect of DRP on the relationship between technology, organization and environment (TOE) on business continuity management (BCM) among UAE firms. Cross sectional data was collected from a sample of 326 employees in UAE, which was quantitatively analysed with Partial Least Square Structural Equation Modelling (PLS-SEM) software. The findings shows that DRP mediates the relationship between technology and environment on BCM. The result presents crucial theoretical, methodological and practical implications to firms operating in UAE, which will promote DRP and BCM realms of knowledge. Finally, limitations and forthcoming research directions were suggested.

Keyword: Business continuity management, disaster recovery plan, technology, organization, environment

INTRODUCTION

Against a background of emergent threats to firms, business continuity management (BCM) has become a systematic process in many industries to pawn the effects of interruptions and crises (Herbane, Elliott & Swartz, 2004). Nevertheless, BCM application varies between countries, while BCM has been popular in some countries, it was found to be at infancy in other countries (Sawalha, 2020). For instance, a notable business information service provider "ZAWYA" situated in Dubai, UAE conducted a survey and found that 70% of businesses in Saudi Arabia, UAE, Qatar, Bahrain, Kuwait and Oman are lacking robust BCM programs (Zawya, 2009). Notwithstanding its importance, the level of BCM awareness and implementation in UAE is still at its infancy across various industries. Herbane (2010) deliberated the growths in the area of BCM and noted that additional research efforts are still required on the utilization and practice of BCM as a business process.

In an empirical BCM study by Chartered Management Institute and in the UK, 73% of respondents described BCM as important to their organizations whereas 94% testified that BCM was able to decrease disruptions (Sawalha, 2020: Strategic Direction, 2008). In the same notion, the 2019 Business Continuity Benchmark Survey revealed that merely 9% of respondents specified their BCM programs as "very mature," 27% believed BCM program in their institutions was "mature" and 33% believed it to be "reasonably mature," this indicates that their BCM approach differed in relations to sound implementation and therefore echoed on the process outcomes. The study also revealed that poor executive support was a challenge that portrayed weakness at the primary phases of BCM program instigation, which is project's planning (Continuity Central, 2019). Thus, one of the broader aspects of great concern and source of problems in implementing business continuity management is managerial capacity. The managerial capacity within the organization refers to all the processes that are implemented to enhance the success and sustainability of the organization, which depends on the four basics: technology, organization, environment, critical personnel.

Business Continuity Management (BCM) is aimed at guaranteeing the operational continuity of organizations, which also plays an essential role in preserving the competitive advantage of firms and the economy as a whole (Chernetska, 2017). BCM is necessary to strengthen the organization during disaster hits and to reduce their possible impact on businesses with minimum interruption — the literature characterize BCM as an evolving practice in the early 2000s. BCM has now became a global business phenomena that has been domesticated by different countries.

For instance, the Abu Dhabi Municipal Sector sets its tools and standards of business continuity management (BCM) to yield successful implementation standard business procedure and competent disaster recovery system according to AE/SCNS/NCEMA 7000:2015. UAE standard AE/SCNS/NCEMA 700**1**:2015 guidelines was adopted by UAE government entities, ISO 22301 (2012) Business Continuity Management Systems and Business Continuity Institute (BCI) Good Practice Guide (2018) Bunjongmanomai, Homanee, Chantabutr & Ratanatanyong (2020). According to UAE standard AE/SCNS/NCEMA 7000:2015, BCM precedes the vital issues in the process of commerce. Multiple connections between BCM execute a great variety of models that forms an autonomous framework in normal business operations according to the set of specific standards.

BCM was eventually broadened and advanced from a technical-focused plan to a more comprehensive organizational continuity plan. This is due to the standards of improvement as set by UAE standard AE/SCNS/NCEMA 7000:2015. BCM process is also suggested to incorporate other vital areas like; responsibilities on human resources, facilities structure, evacuation planning, communications, process planning, attitude and ownerships (Mitchell et al., 2013). In general, BCM have emerged as a structured procedure in responding to the consequences of disaster in many industries (Mitchell, et al., 2017). Furthermore, disaster recovery plan is insufficient for total business restoration and top management of any organizations are progressively requesting the team to not only mitigate or eliminate risks but also minimizing unplanned outages on the business, in a cost-effective manner (Freund et al., 2016). This phenomenon shows those risk management elements and is slowly creeping into the disaster recovery plan. Mitchell, et al., (2017) see the possible convergence between the disaster recovery plan and business continuity management disciplines and suggested for board's strategic discussion in many organization (Mitchell, et al., 2017).

The development of DRP and BCM improvement requires effective implementation of planning, process flow, resource planning, as well as a competent management team. Nevertheless, there are other factors which will likely influence the success or failure of DRP and BCM (Theocharidou et al., 2016).

Despite the importance of business continuity, numerous organizations are still unacquainted on how to effectively implement BCM, particularly if the objective is not to acquire certification (Sawalha, 2020). Several reasons can obstruct the application of effective BCM program; effective BCM approach relies on a sum of activities that need to be sequentially performed. It is also dependent on the degree to which these activities intensify enterprises' BCM awareness and expedite embedding it in the organizational culture (Sawalha, 2020).

Based on the available literature, there are three factors that influence BCM the most i.e. technology, organization and environment (TOE) factors (Abdullah, Noor & Ibrahim, 2015), which will be studied in depth to clarify the extent of their impact on ensuring business continuity and their contribution to the successful implementation of the program.

Technology is the first factor that could influence BCM, as the current era has witnessed leaps in technology, and with the increase in the complexity and multiplicity of operations in the authorities, the connection with technology has increased and has become a cornerstone in organizations and in the municipal system, electronic services have become 100% in concomitance to progress, and any failure in technology directly affects business operations. The need for technologies as external driver of BCM has been increasing, the ISO 17799 standard covers recommended practices for BCM, such as information technology security and data back-up (Herbane, Elliott & Swartz, 2004). The second factor is the organization, which has a major role in determining the extent of focus on the application of business continuity management. Organizations that can quickly and meticulously recover from misfortunes will sustain little harm to their competitive position (Herbane, Elliott & Swartz, 2004). The third is the environment which consist all the internal and external influences that affect the work setting. Since we are in a renewable and constantly changing world, the surrounding conditions also have a major role in the stability and continuity of business in organizations.

Due to the uncertain nature of the current global business environment, DRP is also a strong factor influencing BCM (Sahebjamnia, Torabi, & Mansouri, 2015; Herbane et al., 2004). DRP is a dedicated process to the formation of a plan, categorized as responsive and concerned with hardware and facilities and engrossed with functionally secluded organizational structures (Herbane et al., 2004). However, all the TOE factors could influence the DRP. For instance, technology is a key factor in DRP implementation, without which businesses cannot restore the ability to efficiently provide goods/services to customers, organization and environment are also linked to DRP implementation. As a complex process, DRP is influenced by technology (Hoong & Marthandan, 2014) physical environment, and organization (Bhattarai, Maycock, Alfonso & Reid, 2020; Hoong & Marthandan, 2014). In line with the relationship between TOE - BCM, TOE – DRP and DRP – BCM, the condition for testing mediating relationship have been fulfilled (Baron & Kenny, 1986; Hayes, 2009). Therefore, this study will apply the quantitative approach to describe the mediating effect of DRP on the relationship between technology, organization, and environment on BCM implementation in Abu Dhabi Municipal Sector based on AE standard.

LITERATURE REVIEW

Relationship between Technology and BCM

Nowadays, innovative and all-inclusive approaches are necessary to assist organizations in reducing the impact of unforeseen incidents (Sawalha, 2020). BCM has advanced into a socio-technical method to risk and crisis management (Herbane, Elliott & Swartz, 2004). The strengths of technology on BCM has been witnessed in many industries, for instance; the financial services industry is acknowledged to be at the lead of BCM practice. Financial establishments have long demonstrated the aptitude to extend the state of the art technology through their heavy reliance on Information and Communication Technologies (ICT) (Herbane, Elliott & Swartz, 2004). Firms need to proactively antedate and manage business interruptions to achieve the "systemic implementation of an 'always-on'" enterprise and information system (Bajgoric 2014).

A firm's technology bearing is a significant determinant of an effective BCM response during crisis (Muparadzi & Rodze, 2021). As postulated by Elliott et al. (2010), digital resilience or ICT is a crucial to disaster recovery projects. ICT have made industries and employees (especially banks) to be more productive (Breznitz & Zysman 2013). Similarly, Myers (2006) underlines that many businesses cannot function effectively without digital technology. Technology has the potential to command effective BCM amid disaster induced disruptions by helping organizations to create effective e-continuity processes to guard and sustain essential operations (Muparadzi & Rodze, 2021). A study by Abdullah, Noor and Ibrahim (2015) in Malaysia found that technology is significantly and positively correlated with BCM implementation in the Public Sector.

H1: There is a significant relationship between technology and BCM implementation

Relationship between Organization and BCM

Additional vital requirement for effective BCM implementation is a thorough and strong understanding of the entire organization's activities, including resource requirements and products (Muparadzi & Rodze, 2021). Organizations can attain this by ensuring the BCM plan is appropriately rehearsed (Clark, 2015). The organization concept is linked with the awareness program, policy, budget, and compliance (Abdullah, Noor & Ibrahim, 2015). Organization implementation stands as the execution of policies, adequate budget, adequate level of awareness of BCM as well as acquiring a compliance certificate (Hiles, 2007). According to Pingel et al. (2012), effective BCM should bank on business impact analysis data that ascertains vital resources, assessment of vulnerability that detects threats internal and external activities that are critical, and a strong strategy that classifies dependencies with entire

stakeholders of the organization. BCM managers need to focus on resources that support critical organizational activities and products (Muparadzi & Rodze, 2021). In a Malaysian study, Abdullah, Noor and Ibrahim (2015) established that organization is significantly and positively correlated with BCM implementation in the Public Sector. Therefore;

H2: There is a significant relationship between organization and BCM implementation

Relationship between Environment and BCM

The present day global business environment is featured by incessant change, increasing risk and uncertainty and the requisites to prosper in such environments are different and more intricate than those of witnessed before (Zamborsky, 2020). These conditions also affect all businesses including large corporations, multinationals as well as small and medium enterprises (Bhamra and Dani, 2011). The environment BCM is important to many businesses, as it enables organizations to stay in operation or accelerate recovery during emergency occasions, prevents impending threats, spread coping capacity, and alleviate impact severity (Meechang et al., 2021).

Presently, the long-term survival of businesses and their sustainability is contingent on the guaranteed 24/7 info availability and the continuity of business processes in a more dynamic and diverse environments, stuffed with unanticipated incidents (Sawalha, 2020). The environmental nature of present day business institutions (clustered commercial capitals), and there attractiveness to organized and individual crimes and terror groups has made it indispensable for organizations to plan for effective BCM implementation. This clearly demonstrates the environmental-dependent nature of the drivers for BCM (Herbane, Elliott & Swartz, 2004).

Value preservation has become a subject of increasing concern for external stakeholders such as legislators and other regulatory bodies who subsequently mandate organizations to produce BCM programs. Though such external policies have raised BCM to advanced level of significance, they have also dared organizations to see if their reaction should be a mere compliance to minimum standard or to exceed minimum standards to leverage their BCM competences further (Herbane, Elliott & Swartz, 2004). However, governmental responses to natural catastrophes or terror actions have illuminated the requirement for firms to heighten their potential reactions to business disruptions. Therefore;

H3: There is a significant relationship between environment and BCM implementation

Relationship between Technology and DRP

Technology has become crucial to the survival of firms. Many organizations rely on technological systems to perform their daily operations and help in the process of decision

making, disruption to technological structures even for a few days may result in severe economic loss which can threaten business survival (Omar, Alijani & Mason, 2011). DRP has typically focused towards failures in technology and natural calamities (Herbane, Elliott & Swartz, 2004).

H4: There is a significant relationship between technology and DRP

Relationship between Organization and DRP

The organization concept is linked with the awareness program, policy, budget, and compliance (Abdullah, Noor & Ibrahim, 2015). Evans (2016) asserted that the realization of effective DRP rest on the regular test and updates of the DRP. Testing assures that changes to the business processes may not essentially trigger a requirement for procedural adjustments (Beaman & Albin 2008). Ashford (2007) indicated that plans that are poorly tested may portray a false sense of safety and deceitful assurance of an organization's ability to recover. The more frequently DRP is tested, the better the chance for amiable continuity of operations (Zalud, 2008). As a dynamic process organizations must be updating and revising their DRP on a regular basis to go in line with technology and business changes (Saccomanno & Mangialardi 2008). Thus, effective policy, program and compliance which are essential to the organization concept must be appropriately put in place for effective DRP implementation. Therefore;

H5: There is a significant relationship between organization and DRP

Relationship between Environment and DRP

Organizations today, realized that survival and growth in the era of rapid change depends on strong and supportive environment, firms need to scan and forecast their corporate environments to understand the factors that may negatively affect their performance (Yu et al., 2019; Fink et al., 2005). Business disruptions are likely to arise at any level, and at any moment, and may vary with regard to their level of impact (Das, 2018).

H6: There is a significant relationship between environment and DRP

Relationship between DRP and BCM

DRP and BCM are closely related frameworks that guarantee sustained operations of organizations after the occurrence of a disaster (Barnett-Quaicoo & Ahmadu, 2020). The DRP approach accentuates on disaster recovery rather than prevention because disasters are in most cases beyond human control (Quarantelli, 1988). Founding a reliable DRP is crucial to organizational survival during and after disastrous events (Omar, Alijani & Mason, 2011). In both theory and practice, DRP has been associated with BCM (Herbane, Elliott & Swartz, 2004).

Cervone (2017) found that DRP implementation can help to guarantee the emergence and viability of BCM within an organization. Since DRP is believed to support organizations in reinstating their operations after a substantial disruption with a minimal time lag, effective DRP will significantly influence the BCM of organizations (Omar, Alijani & Mason, 2011). Therefore;
H7: There is a significant relationship between DRP and BCM implementation

Mediating effect of DRP on the Relationship between Technology, Organization, Environment and BCM

DRP entails the processes and policies that are put in place to recover the critical operations of a business, in reaction to any disaster (Hoong & Marthandan, 2011). Acoording to Hoong and Marthandan (2011) DRP is an important subset of BCM. DRP is indispensable for organizations to remain steadfast in the event of disasters and disruptions (Sawalha, 2021). Horney et al. (2016) showed that an increasing number of businesses and governments are adopting DRP to assist in the recovery processes. Relying on the literature and the hypothesized relationships between technology, organization, environment, critical employees and BCM, and the hypothesized relationships between technology, organization, environment, critical employees and DRP, as well as the hypothesized relationship between DRP and BCM; the requirements for the introduction of DRP as a mediator on the relationships between technology, organization, environment, critical employees and BCM have been fulfilled (Baron & Kenny, 1986). Therefore, the following mediation hypotheses have been postulated:
H8: DRP will significantly mediate the relationship between technology and BCM implementation
H9: DRP will significantly mediate the relationship between organization and BCM implementation
H10: DRP will significantly mediate the relationship between environment and BCM implementation

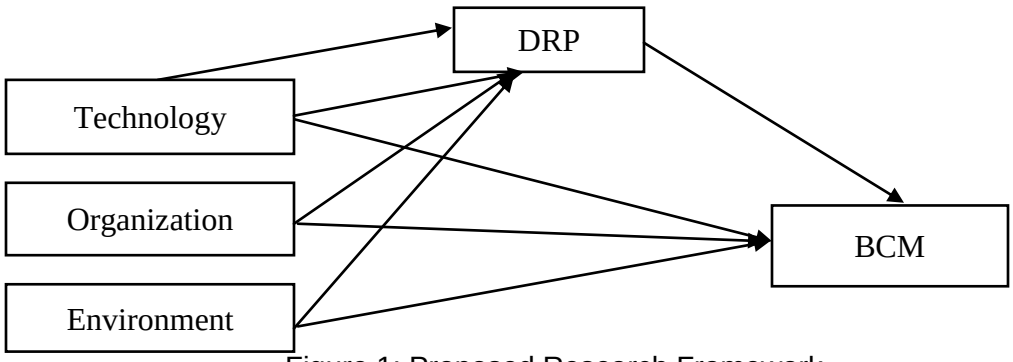

Figure 1: Proposed Research Framework

METHODOLOGY

Quantitative data analysis method was used for this study, based on cross-sectional time horizon data collection. The researcher relied on the deductive approach because it follows the path of logic most closely (Palermo & Pagliara, 2020). Deductive approach helps in identifying the hypothesis of a previously existing phenomenon or theory on some accepted findings.

Moreover, survey questionnaire was used as the main data collection method for the collection of primary data in this study. On the other hand, there are four strategies, according to Saunders et al. (2007) which helps in initiating and conducting research. The four strategies are survey, case study, action research, and experimental. In this research, the survey strategy was be employed, because it is more direct, more practical and has a lower cost (Mullinix, Leeper, Druckman & Freese, 2015).

The population of this study is made up 2152 employees of Abu Dhabi Municipal Sector. Abu Dhabi Municipal Sector is chosen because it is the capital of UAE which consist so many various organizations and employees that will give a wider coverage and serve the purpose of this study. As per Krejcie and Morgan (1970) formula, the sample will be 326 of the total population which will be further subdivided into subgroups known as strata making stratified sampling the most ideal. The essence of using stratified sampling is to ensure that all the population has been adequately represented. Finally, the Statistical Package for Social Science (SPSS) version 21 and Partial Least Square - Structural Equation Model software PLS-SEM 3.2.7 was used for the analysis of data.

The measurement items for the five variables in this study were adopted from previous similar researches using a 5 point Likert scale questionnaire that ranges from 1- strongly disagree to 5- strongly agree. The first part of the questionnaire consist of the demographic background, the second part consists the measurements of dependent variable i.e. BCM which has six items adapted from Kato & Charoenrat, (2017). The third part consists the measurements for DRP (mediating variable) which entails nine items adapted from Mathenge, (2011) and Byadigera (2019). The fourth part of the questionnaire consists the measurement of independent variables which include; technology, organization and environment which were all adapted from previous researches. In specific, technology variable has thirteen items from three technology sub dimensions; perceived simplicity (4 items), compatibility (4 items) and perceived value (5 items) which were all adapted from Awa, Ojiabo and Orokor (2017). Organization variable has eleven items extracted from three organization sub dimensions; top management support (5 items), employee skills (3 items), and organizational competency (3 items) which were adapted from Gangwar and Ramaswamy (2015). Finally, the environment variable has

eight items extracted from two sub dimensions; normative pressure (4 items) and mimetic pressure (4 items) which were adapted from Awa et al. (2017).

ANALYSIS AND RESULTS

The analysis of data was conducted by means of SPSS version 21 and PLS-SEM 3.2.7. The SPSS was used for descriptive analysis and data screening, while the PLS software was utilized for inferential statistics.

Rate of Response

A total of 326 questionnaires were distributed through online and hand delivery methods. A follow up for the return of the questionnaires have been used to attain greater response rates (Sekaran, 2003). This results in a total of 281 retrieved questionnaires, from the 326 distributed questionnaires i.e. 86% a rate of responses. All the 281 responses were found to be usable for multivariate analysis. This rate of response is believed to be adequate for the final analysis, because Sekaran (2003) suggested an aggregate of 30% rate of response is sufficient for surveys.

Data Screening and Preliminary Analysis

Prior to any multivariate analysis, data screening must be conducted to help the researcher in satisfying the basic assumptions of multivariate analysis (Hair et al., 2007). The preliminary analysis will help researchers to identify any possible violation in the assumptions of multivariate analysis. After the data input and coding, the following preliminary analyses were performed: (a) missing data values analysis (b) outlier response analysis, (c) normality of data test, and (d) multicollinearity assessment test (Hair Jr., Black, Babin, & Anderson, 2010; Tabachnick & Fidell, 2007). All the basic assumptions of multivariate analysis were found to be satisfied.

Specifically, regarding missing values step by step procedure was employed during data key in to ensure no missing data. However, when any missing information identified then the researcher had to go back and trace the questionnaire affected. Moreover, where the questionnaire does not include the answers then such questionnaire had to be dropped. Accordingly, the result shows that out of 15,170 data points in the original SPSS only 8 (i.e. 0.052%) were missed. Thus this is insignificant as suggested by Tabachnick & Fidell, (2007). In addition, regarding outlier the present study used frequency table in SPSS for all variables using minimum and maximum statistics. This was done in order to detect any wrong entry of data. Accordingly, in the frequency tables no value appeared to be outside the expected range.

Demographic Profile of Respondents

This section deals with the demographic profile of respondents. The observed demographics covers gender, age, study qualification, years in service, years in present position and industrial sector (see Table 1).

Table 1: Respondent's Demographic Features

S/No.	Items	Frequency	Percent (%)
1	**Gender**		
	Male	243	86.5
	Female	38	13.5
2	**Age**		
	25 years and below	11	3.9
	26-35 years	89	31.7
	36-45 years	135	48.0
	46-55 years	39	13.9
	56 years and above	7	2.5
3	**Educational Qualification**		
	Primary Education Certificate	2	0.7
	Secondary School Certificate	29	10.3
	Diploma Certificate	24	8.5
	Bachelor's Degree/HND Certificate	93	33.1
	Postgraduate Education Certificate	128	45.6
	Any other Qualification	5	1.8
4	**Position of respondents**		
	Executive Manager	64	22.8
	Middle Manager	150	53.4
	Low level Manager	63	22.4
	Others	4	1.4
5	**Years in Service**		
	Less than 10 years	65	23.1
	11-20 years	121	43.1
	21 years and above	95	33.8
6	**Years in current position**		
	Less than 5 years	112	39.9
	6-10 years	83	29.5
	11 years and above	86	30.6
7	**Industrial Sector of the Firm**		
	Agricultural Sector	5	1.8
	Service Sector	230	81.9
	Manufacturing Sector	31	11.0
	Oil Sector	13	4.6
	Building and Construction	2	0.7

*HND = Higher National Diploma

As presented in Table 1, majority of the respondents, i.e. 243 (86.5%) are male while 38 (13.5%) were female. However, 11 respondents representing 3.9% are 25 years of age and below, 89 respondents i.e. 31.7% are between 26-35 years of age, 135 respondents i.e. 48% are between 36-45 years of age, 39 respondents i.e. 13.9% are between 46-55 years and only 7 respondents i.e. 2.5% are 56 years of age and above. For educational qualification, only 2 respondents (0.7%) hold a primary education certificate, 29 respondents (10.3%) hold a secondary school certificate, 24 respondents (8.5%) hold a Diploma certificate 93 respondents (33.1%) hold a Bachelor's Degree/ Higher National Diploma (HND) certificate, 128 of the respondents (45.6%) obtained a postgraduate education certificate and only 5 respondents (1.8%) have other qualifications not listed here. The respondents consist of 64 executive managers (22.8%), 150 middle managers (53.4%), 63 low level managers (22.4%) and 4 employees (1.4%). The respondent's years in service include 65 respondents (23.1%) with less than 10 years in service, 121 respondents (43.1%) with 11-20 years in service, and 95 respondents (33.8%) with 21 years in service and above. Most of the respondents 39.9% i.e. 112 respondents have spent less than 5 years in their current position, 83 respondents (29.5%) spent 6-10 years in their present position, and 86 respondents (30.6%) expend 11 years and above in present position. Finally, the industrial sector of the firms that responded in the survey includes 5 firms (1.8%) from the agricultural sector, 230 firms (81.9%) from service sector, 31 firms (11%) from manufacturing sector, 13 (4.6%) from the oil sector and 2 firms (0.7%) from the building and construction sector.

Assessment of PLS-SEM Path Model Results

PLS-SEM analysis is a two-step structural process (Henseler, Ringle and Sinkovics, 2009) and these two steps were compute and reported in this study. The first step compute and reports the measurement model assessment, whereas the second step compute and report the assessment structural model (Hair et al., 2014, 2012; Henseler et al., 2009).

Measurement Model Assessment

The assessment of measurement model includes establishing the individual items internal consistency, construct reliability, content validity, convergent validity and discriminant validity (Hair et al., 2014; Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009). Figure 2 depicts the measurement model of this study.

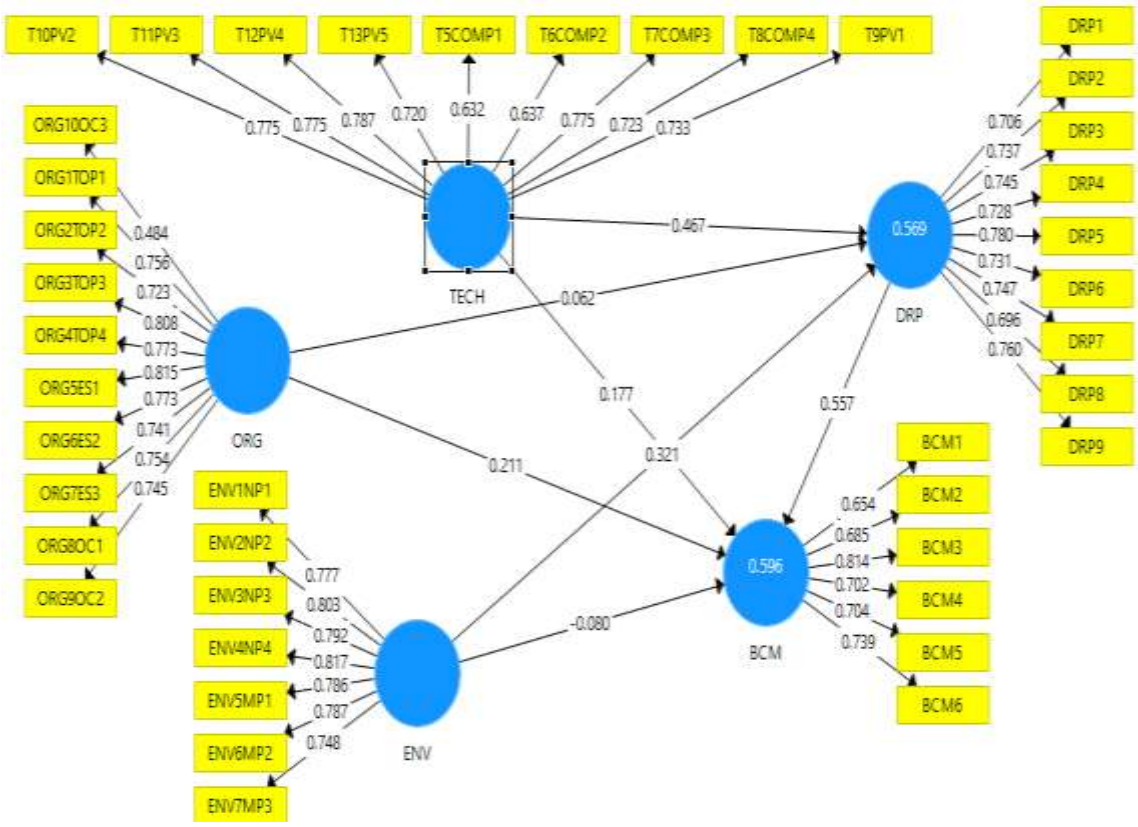

Figure 2: Measurement Model

Individual Item Reliability

Evaluation of individual items reliability was observed by computing the outer loadings of each item for each of the study constructs (Duarte & Raposo, 2010; Hair et al., 2014, 2012; Hulland, 1999). The measurement model outer loadings is accepted should be ≥ 0.70 which is the standard threshold (Hair et al., 2017). However, indicators that have between .40 and .70 loadings may be retained if their deletion will not lead to an increase in content validity (Hair et al., 2014; 2017). Consequently, 6 items were removed out of the 47 items. The complete model therefore reserved 46 items that have loadings between 0.456 and 0.833 (see Table 2).

Table 2: Construct Reliability and Validity

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
BCM	0.811	0.864	0.516
DRP	0.895	0.914	0.543
ENV	0.898	0.919	0.619
ORG	0.907	0.924	0.553
TECH	0.890	0.911	0.534

TECH= Technology, ORG= Organization, ENV=Environment,
BCM= Business Continuity Management and DRP= Disaster Recovery Plan.

Internal Consistency Reliability

Internal consistency is the degree to which all indicators/items are capable to measure the same construct on a definite scale (Bijttebier et al., 2000; Sun et al., 2007). The Cronbach's alpha or composite reliability coefficients are the most common techniques for evaluating instrument's reliability in organizational studies (Bacon, Sauer, & Young, 1995; McCrae, Kurtz, Yamagata, & Terracciano, 2011; Peterson & Kim, 2013). Both techniques i.e. Cronbach's alpha and composite reliability coefficients were engaged in this study.

Among the two popular techniques, the use Cronbach's alpha coefficient has been more prevalent, which is sometimes complemented by the composite reliability technique as it is in this study. There are two main reasons in doing that: first, the composite reliability provides reliability coefficient values that are substantially less biased compared to Cronbach's alpha coefficients because the later postulates all items/indicators contribute equally to a construct without regard to the actual impact of individual loadings (Barclay, Higgins, & Thompson, 1995; Gotz, Liehr-Gobbers, & Krafft, 2010). The second reason is that the Cronbach's alpha underestimates the reliability coefficients of scales. But, the composite reliability coefficient considers the item indicators to have divergent loadings which might be interpreted in the same way as Cronbach's alpha. The internal consistency threshold values for both Cronbach's alpha and composite reliability must be at least ≥ 0.70 (Bagozzi & Yi, 1988; Hair et al., 2011). The results (see table 3) indicates that the internal consistency for all the constructs in this study are satisfactory.

Table 3: Construct Reliability and Validity

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
BCM	0.811	0.864	0.516
CP	0.878	0.911	0.673
DRP	0.895	0.914	0.543
ENV	0.898	0.919	0.619
ORG	0.907	0.924	0.553
TECH	0.890	0.911	0.534

Convergent Validity

Convergent validity is the degree to which items of a research questionnaire is representing the constructs it is intended to study correctly and truly correlate with other indicators of the corresponding construct (Hair, Black, Babin, Anderson, & Tatham, 2006). To scrutinize the convergent validity for this study, the Average Variance Extracted (AVE) was computed for each of the constructs in this study (Fornell & Larcker, 1981). The AVE threshold

for each construct is acceptable when it is above 0.50 and that is when a satisfactory convergent validity can be declared (Chin, 1998). This study shows that a satisfactory level of convergent validity has been achieved for each construct, since all AVE values are beyond 0.50 for each of the constructs in this study (see Table 3).

Discriminant Validity

Discriminant validity is the degree to which a particular construct deviates from another is (Duarte & Raposo, 2010). While the Fornell-Larcker discriminant validity criterion has been very popular, it has been criticized for performing poorly in discriminant validity assessment particularly when constructs only differ slightly (Henseler et al., 2015). Therefore, Henseler et al. (2015) suggests the use of heterotrait-monotrait ratio (HTMT) assessment of correlations. Consequently, HTMT technique was employed to establish the discriminant validity for this study (Henseler et al., 2015). The conservative threshold for HTMT ratio is 0.85 and 0.90 for the most liberal. Any HTMT ratio that is below 0.85 (conservative) or below 0.90 (liberal) suggests a satisfactory discriminant validity result for the study constructs. The HTMT ratio values for constructs portrayed in Table 4 are less than the liberal threshold of 0.90 which shows a satisfactory discriminant validity.

Table 4: Heterotrait-Monotrait Ratio

(HTMT ratio)

Constructs	BCM	DRP	ENV	ORG	TECH
BCM					
DRP	0.858				
ENV	**0.606**	**0.726**			
ORG	**0.616**	**0.544**	**0.653**		
TECH	**0.736**	**0.784**	**0.705**	**0.602**	

Assessment of Significance of the Structural Model

After establishing the validity and reliability of the measurement model, the structural model will be computed. The structural model is computed based on the standard bootstrapping method using 5000 bootstrap samples as recommended by Hair et al. (2017) to gauge the path coefficients significance for the 281 data responses. Figure 3 and Table 5 depicts the structural model estimates for the complete model include both direct and indirect relationships i.e. the mediator variable.

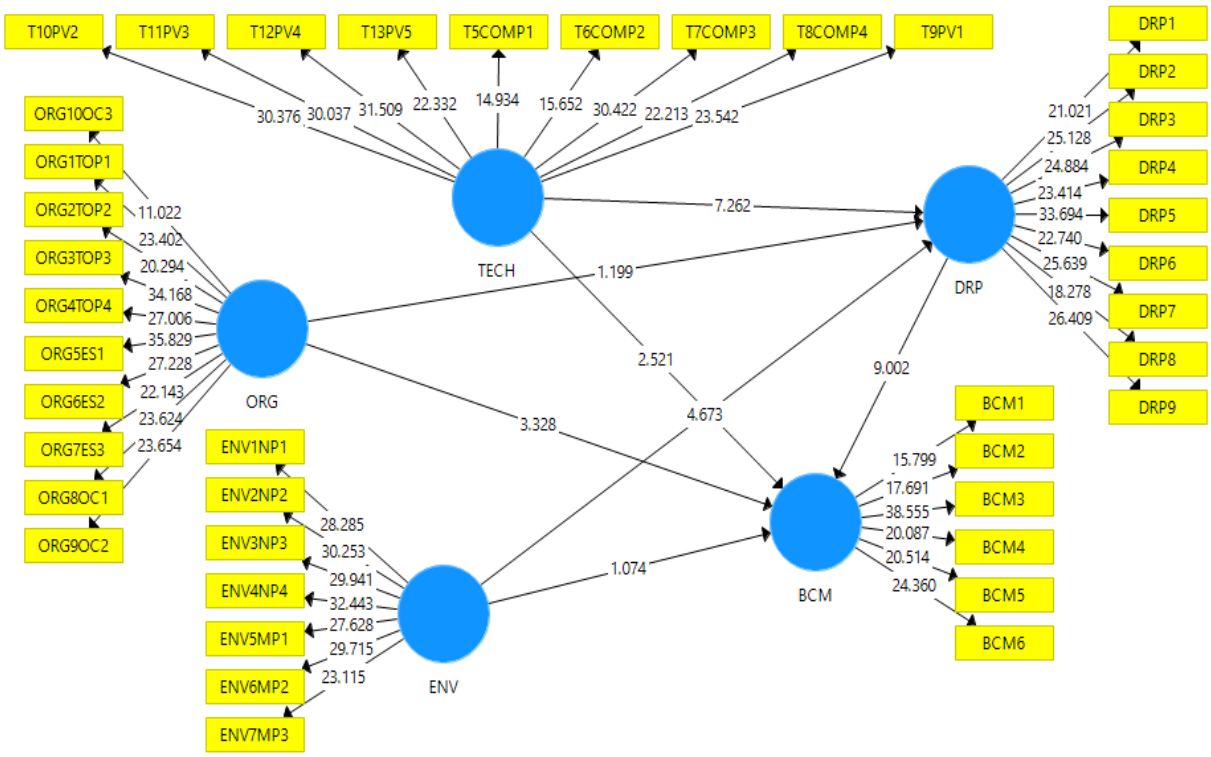

Figure 3: PLS-SEM bootstrapping (full model)

Table 5: Structural Model Assessment

Hypothesized Relationships	Sample Mean Beta (β)	Standard Deviation (STDEV)	T Statistics	P Values	Decision
H1: TECH -> BCM	0.179	0.070	2.521	0.006	**Accept**
H2: ORG -> BCM	0.214	0.063	3.328	0.000	**Accept**
H3: ENV -> BCM	-0.081	0.074	1.074	0.141	Reject
H4: TECH -> DRP	0.468	0.064	7.262	0.000	**Accept**
H5: ORG -> DRP	0.065	0.052	1.199	0.115	Reject
H6: ENV -> DRP	0.321	0.069	4.673	0.000	**Accept**
H7: DRP -> BCM	0.555	0.062	9.002	0.000	**Accept**
H8: TECH -> DRP -> BCM	0.259	0.045	5.805	0.000	**Accept**
H9: ORG -> DRP -> BCM	0.036	0.029	1.201	0.115	Reject
H10: ENV -> DRP -> BCM	0.178	0.043	4.163	0.000	**Accept**

The first hypothesis (H1) shows that Technology has a positively significant relationship with BCM (β = 0.179, t = 2.521, p = 0.006) as displayed in Table 5 and figure 3. The result therefore supports Hypothesis 1. The second hypothesis (H2) postulates that Organization and BCM will have a positive significant relationship. Results from Table 5 indicated that Organization had a significant relationship with BCM (β = 0.214, t = 3.328, p = 0.000) thus, H2 is supported.

On the other hand, result of the third hypothesis (H3) which postulates the positive significant influence of Environment on BCM is rejected. This is because the result shows an insignificant relationship between Environment and BCM (β = -0.081, t = 1.074, p = 0.141).

Technology is also proposed to positively influence DRP in Hypothesis 5 (H4). As presented in Table 5, the proposition in H5 is supported (β = 0.468, t = 7.262, p = 0.000) since the p value is less than 0.05. For the sixth Hypothesis (H5), the relationship between Organization and DRP (β = 0.065, t = 1.199, p = 0.115) is found to be insignificant as the p value = 0.109, this therefore leads to the rejection of H5. In the seventh hypothesis (H6) Environment was predicted to have a significant positive relationship with DRP. In compatibility, the result shows a significant positive relationship between Environment and DRP (β = 0.321, t = 4.673, p = 0.000). Thus, H6 is supported in this study.

The mediator variable i.e. DRP was also found to have a significant positive relationship with the dependent variable i.e. BCM as proposed in hypothesis 7 (H7). The result shows that DRP and BCM are significantly related at 1% level of significance (β = 0.555, t = 9.002, p = 0.000). Based on the T value of 9.002 this DRP is the strongest variable that influence BCM, H7 is therefore supported.

Baron and Kenny (1986) that mandates the existence of a direct significant relationship between independent variable(s) and dependent variable as the first step for mediation effect to be guaranteed, but Hayes, (2009) argued that the significant relationship between independent variable(s) and the mediating variable as well as the relationship between the mediating variable and the dependent variable are enough to proceed with mediation analysis. Thus, these two steps identified by Hayes, (2009) have been used to satisfy the conditions to run the mediation analysis in this study. In accordance, hypotheses 10, 12 and 13 are very likely to have a significant mediating effect since hypotheses 5, 7, 8 and 9 are found to be significant in this study. But the mediating effect of hypotheses 11 is very unlikely because the condition for a significant hypothesis 6 is not fulfilled.

The mediating results are interpreted as follows: Hypothesis eight (H8) postulates a significant positive mediating effect of DRP on the relationship between technology and BCM. The results in table 5 (β = 0.259, t = 5.805, p = 0.000) shows that H8 is supported. Contrarily, results for the mediating effect of DRP on Organization and BCM relationship as suggested in hypothesis nine (H9) is found to be not supported (β = 0.036, t = 1.201, p = 0.115). However, in compliance with the postulations of the tenth hypothesis (H10), the mediating effect of DRP on the relationship between environment and BCM shows a significant positive effect (β = 0.178, t = 4.163, p = 0.000). This therefore, supports the H10 postulation.

Assessment of Coefficient of Determination (R^2)

One vital criterion for evaluating PLS-SEM structural model is the R^2, otherwise known as the coefficient of determination (Hair et al., 2012; Hair et al., 2011; Henseler et al., 2009). The coefficient of R^2 represents the proportion of variation in the dependent variable(s) that is explained by predicting variables in a model (Hair et al., 2010). The R^2 value of 0.10 is considered acceptable (Falk & Miller, 1992). Nonetheless, R^2 values of 0.67, 0.33 and 0.19 are assumed to be substantial, moderate, and weak, respectively (Chin, 1998). Table 6 represents the R^2 values of the complete model in this study.

Table 6: Variance Explained in the Endogenous Latent Variables

Latent Variables	Variance Explained (R^2)
BCM	0.596
DRP	0.569

As represented in Table 6, the study model explains 59.6% of the overall variance in BCM and 56.9% of the overall variance in DRP. This suggests that the independent variables (i.e., technology, organization, and environment) collectively explained 59.6% and 56.9% of the variance of BCM and DRP respectively. Thus, the R^2 values for this study are moderate and adequately acceptable (Chin 1998; Falk and Miller 1992).

DISCUSSION

H1 testing suggests that technology positively influence BCM, which corresponds with previous research outcomes that support technology - BCM relationship (Muparadzi & Rodze, 2021; Breznitz & Zysman 2013; Myers 2006; Abdullah et al., 2015). Technology is nowadays, essential in assisting organizations to cut the effect of unforeseen occurrences and improve continuity of businesses (Sawalha, 2020) thus, firms need to consider effective adoption of technology to ensure BCM. H1 therefore, implies that technology is an important predictor of BCM accomplishments. H2 result also shows significant relationship between organization and BCM implementation. This finding corresponds with previous research findings and arguments (Muparadzi & Rodze, 2021; Abdullah et al., 2015; Clark, 2015; Pingel et al., 2012; Hiles, 2007). Thus, organization factor is allied with policy, awareness program, budget, and compliance (Abdullah, Noor & Ibrahim, 2015) that could improve BCM.

On the other hand, H3 result is contrary to its proposition, because the result shows insignificant relationship between environment and BCM which leads to the rejection of H3. This finding contradicts previous literature arguments about the relationship between environment and BCM implementation (Sawalha, 2020; Herbane et al., 2004; Meechang et al., 2021).

Environmental factors can be either normative or mimetic pressures (Awa et al., 2017). Normative pressures comes from customers, trading partner's demands, legal framework, professional associations, and governments (Deephouse, 1996). On the other hand, mimetic pressures come from the conscious and curious monitoring of other industry players to correspondingly mimic their actions in order to remain competitive (Awa et al., 2017). Thus, a possible reason for the insignificant H3 result may be the resulting culture, context and sample characteristics. Organization can be said to predict BCM when there is increasing pressure from trading partners, governments or professional associations (normative) or pressure from other strong competitors in the industry. In the case of the study sample, both normative and mimetic pressure are not strong enough to influence BCM.

However, the technology - DRP relationship proposed in H4 was supported. This means that, effective adoption of technology will positively influence DRP among UAE firms. Technological context focuses on both internal and external technologies that are useful for company's DRP efforts. H4 result further illustrates that a firm's prevailing technology is imperative in the adoption of DRP processes. DRP comportments are very complex, due to the unforeseen occurrence disaster incidences at different times. However, the greater the technology resources available to a firm the stronger will its response to disaster and DRP.

In contrary, H5 shows insignificant relationship between organization and DRP, which is opposing to the arguments of preceding studies (Abdullah et al., 2015; Evans, 2016; Saccomanno & Mangialardi 2008). This finding may not be unconnected with the poor level of awareness programs, policy, budget, and compliance with DRP implementation within the context of this study. No matter how good the awareness programs, policy, and budget, the organization factor will not be significant if the DRP compliance aspect is lacking.

In compliance, H6 shows a positive significant relationship between environment and DRP which corroborates previous empirical literature (Hoong & Marthandan 2014). Accordingly, external and internal environmental pressures for organizational growth and survival are one of the critical factors that influence DRP. Environment is very important in DRP of businesses, as it enables organizations to stay in operation or accelerate recovery during emergency occasions, prevents impending threats, spread coping capacity, and alleviate impact severity (Meechang et al., 2021). Organizations today, realized that survival and growth in the era of rapid change depends on strong and supportive environment, firms need to scan and forecast their corporate environments to understand the factors that may negatively affect their performance (Yu et al., 2019; Fink et al., 2005). This finding supports the Institutional Theory and TOE theory that organization's environment can spur the DRP implementation of organizations in UAE.

Therefore, to improve DRP among organizations, the environment need to be strengthened and geared towards that effect.

Consistent to the postulation in H7, the result specifies a significant positive relationship between DRP and BCM. This illuminates that the more DRP implementation by an organization, the greater their BCM will be. DRP and BCM are closely related frameworks that guarantee sustained operations of organizations after disastrous occurrences (Barnett-Quaicoo & Ahmadu, 2020). Founding a reliable DRP is crucial to organizational survival during and after disastrous events (Omar, Alijani & Mason, 2011). Effective DRP will therefore, significantly influence BCM (Omar, Alijani & Mason, 2011). Hence, organizations must be acquainted with DRP implementation processes since it is contingent to BCM.

The mediating hypothesis shows two of the three hypothesized relationships are supported. The result of H8 shows a significant mediating effect of DRP on the relationship between technology and BCM implementation. Therefore, technology was found to influence BCM positively through the mediating role of DRP. In accordance, technology will support UAE firms in increasing and strengthening DRP, which will subsequently improves BCM. The result also suggests that technology alone is not enough to guarantee effective BCM unless it passes through the conduit of DRP. In a nutshell, this finding is in line with the TOE and institutional theories, which suggests the impact of technology on organizational effectiveness such as DRP and BCM.

The mediating effect of DRP on organization and BCM implementation relationship as proposed in H9 failed to be supported. This is not surprising, given that the organization and DRP relationship in H5 was not significant as earlier reported. The possible reason for this insignificant finding may be due to poor organizational culture and values towards DRP implementation among firms in the study context. Hence, DRP could not further explain the relationship between organization factor and BCM among firms in Abu Dhabi UAE. In other words, the role of DRP in expounding organization and BCM relationship is not essential.

Finally, the mediating effect of DRP on the relationship between environment and BCM implementation posited in H10 was supported. This illustrates that, environment has a positive influence on BCM implementation through the mediating role of DRP implementation. This validates the importance of environment in the ability to implement DRP, to subsequently nurture BCM. As a result, BCM is contingent on environment factors through DRP implementation. This also supports the TOE and institutional theories which suggests organizational effectiveness is contingent to environmental factors, and essential to promote DRP and BCM implementation.

IMPLICATIONS OF THE STUDY

Recently, the attention of researchers and practitioners has been devoted to the BCM of organizations. Based on the findings of this study, some important theoretical implications were uncovered, particularly with regards to the mediating effect of DRP on the relationship between TOE variables and BCM. The result offers additional support for the TOE theory in the context of this study. Practical implications also indicate the importance of technology, environment and DRP on BCM implementation. The methodological implication affirmed the cultural validity of the technology, organization, environment, DRP and BCM measurements that were initially established in developed countries and western cultures. These measurements were refined and tested in the context of UAE, which is an important contribution, because the scales were not appropriately tested in the UAE before now.

LIMITATIONS OF THE STUDY

Despite validating most of the hypothesized relationships of this study, some limitations were identified. First, the data collection was based on a cross-sectional design which does not allow causal conclusions from population of the study. Moreover, self-report measures were used to measure all the study variables. Objective measures could have been better for the study because self-report measures are associated with common method bias (Podsakoff et al., 2003) and social desirability bias (Podsakoff & Organ, 1986). To reduce these concerns the anonymity of respondents was guaranteed and scale items were improved (Podsakoff et al., 2003, 2012). In addition to the just mentioned study confinements, this study offers limited generalizability because the subjects are principally concentrated in Abu Dhabi which is only one state in the UAE.

DIRECTIONS FOR FURTHER RESEARCH

Future research efforts should consider longitudinal design of data collection to gauge the theoretical concepts of this study to augment or ratify the findings of this study. Peer ratings may also be helpful to control social desirability and common method bias. Future researchers can however, replicate the study in a wider context across UAE using the same or similar measures to enhance the generalizability of these findings.

Future researchers should also consider other important variables that could explain the remaining variance in DRP and BCM respectively to further the implementation of both DRP and BCM among firms. To end, moderating effects may be introduced to assess the possible change in relationships that were found not to hold in this study.

CONCLUSION

In conclusion, this study delivered further empirical evidence to the evolving literature of technology, organization, and environment on BCM through the mediating role of DRP implementation. Findings of this study have reinforced most of the theoretical propositions. Precisely, the findings successfully answered the questions and objectives developed in this study, some limitations were found though. Despite the many studies that exist on the predictors of BCM, this research addressed the standing theoretical gaps by integrating DRP implementation as a significant mediator between the predictors of BCM. The framework therefore, contributes to the domain of TOE and institutional theories.

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