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Key Success Factors and Barriers for Implementation of Information Communication Technology (ICT) In Small and Medium Enterprises (SMEs): Evidence from Developing Nation

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Abstract

Based on a survey conducted among 221 participants representing medium sized enterprises in Kathmandu this study reveals important findings, about the challenges and opportunities faced by these businesses. The analysis, which was supported by reliability tests highlights "Internal Readiness/Trainings" as the factor for successful implementation of information and communication technology (ICT) while "External Barriers" are identified as significant obstacles. To identify the components Principal Component Analysis (PCA) was utilized. These components serve as the foundation for a framework aimed at improving ICT implementation in SMEs. The main factors contributing to success include support, from top level management incentives for team members training for IT workforce effective change management practices and thorough software testing. On the hand barriers include awareness of ICT benefits and concerns related to data security.

Keywords: IT Implementation; CSF; ICT factors; ICT barriers; SME; ICT; PCA

Introduction

Enterprises are often categorized based on factors such as the number of employees, annual sales, assets, or a combination of these criteria [1]. Within this categorization, Small and Medium-sized Enterprises (SMEs) hold a significant role and are widely recognized as vital contributors to a nation's economic growth and stability [2]. Unfortunately, many SMEs face the risk of failure, often attributed to a lack of timely and accurate data and information [3]. However, the adoption of Information and Communication Technology (ICT) can play a pivotal role in increasing the success rate of these enterprises [4]. SMEs play a crucial role in generating employment opportunities, thereby contributing to the overall economic growth of a nation [5]. They also foster a more competitive market environment [6]. To ensure the success of SMEs, it is essential to identify and prioritize Critical Success Factors (CSFs), which can vary depending on the type of enterprise and the specific regulations and policies of each country [7]. These CSFs encompass a wide range of factors, including those related to the enterprise itself, its business operations, and the entrepreneurial spirit behind it [8]. The presence and utilization of accurate and comprehensive data and information are fundamental to the survival and prosperity of organizations [9]. The rapid evolution of ICT has had a profound impact on organizations, catalyzing their growth [10]. However, even the most well-designed and rigorously tested IT tools may fall short of meeting an organization's actual requirements [11]. Therefore, the successful implementation of IT systems within an organization necessitates careful consideration of all factors and conditions that may influence both the implementation process and the system's effectiveness during its operational phase [12]. It is noteworthy that the success rate of IT system implementation, particularly in terms of executing a well- devised plan, tends to be low [13]. This can be attributed to a multitude of factors, encompassing technical,

economic, organizational, behavioural, and psychological aspects. The complexity of IT system implementation arises from the collaboration between two distinct entities: the service provider and the service recipient [14]. Consequently, it becomes imperative to identify and understand the various factors that impact the effectiveness of IT system implementation. Enterprises are often classified based on factors such as number of employees, annual sales, assets, or a combination of these criteria. In this classification, small and medium enterprises (SMEs) play a significant role and are widely recognized as significant contributors to the economic growth and stability of the country. Unfortunately, many SMEs face the risk of failure, which is often attributed to a lack of timely and accurate information and information. However, the adoption of Information and Communication Technology (ICT) plays an important role in increasing the success of these projects.

SMEs play an important role in creating employment opportunities, thus contributing to the overall economic development of the country. They also create a more competitive market environment. In order for SMEs to succeed, it is important to identify and prioritize critical success factors (CSFs), which may vary depending on the type of company and the specific laws and regulations of each country. These CSFs include a wide range of factors related to the firm itself, its business activities and the entrepreneurial spirit behind it Sun. The availability and use of accurate and comprehensive information and information is fundamental to the survival and success of organizations. The rapidly developing information technology has had a tremendous impact on organizations and has acted as a catalyst for their growth. However, even well-designed and well-tested IT tools may not meet the real needs of an organization. Hence the perfect implementation. While Nepal's small and medium enterprises (SMEs) sector has grown tremendously in recent years, the challenge of organizing these projects and ensuring their long-term success remains daunting [15]. The high failure rate of Nepali SMEs may be partly due to the struggle to adapt to the local business environment and effectively implement Information Technology (ICT) systems, the challenges and opportunities have not been adequately explored. There is a crucial need to identify and understand the key success factors that can lead to sustainable development of Nepali SMEs through ICT implementation. Furthermore, it is important to highlight the key barriers that hinder the effective use of ICT in these sectors. This study aims to address this gap by exploring the complex contextual and emotional interactions that affect ICT use in Nepalese SMEs. The overall objective is to develop a customized framework that can guide these companies towards better adoption of ICT, enabling them to overcome their challenges and understand the opportunities in the dynamic business environment of Nepal.

Literature Review

Research pertaining to the adoption of Information and Communication Technology (ICT) has consistently demonstrated that Small and Medium-sized Enterprises (SMEs) in developing countries face challenges in fully leveraging technological advancements to expand their business operations [16-19]. Consequently, there exists a compelling need for a deeper comprehension of the determinants influencing ICT adoption and the factors that propel or inhibit its implementation and utilization [20]. As early as 1996, scholars acknowledged that ICT integration within organizations had evolved from being optional to becoming an imperative for survival, underscoring the urgency and significance of adopting novel technologies [21]. Information and Communication Technology (ICT) stands as a key catalyst for business performance and directly shapes the success of enterprises [22]. It exerts a positive influence on economic growth and development by enhancing operational efficiency and productivity. ICT is instrumental in optimizing resource allocation, mitigating transaction costs, and fostering technological advancements [23]. SMEs in developing countries face unique challenges in ICT integration, ranging from suboptimal management practices and limited technology access to constrained credit facilities, educational gaps, unemployment, and obstacles like ICT infrastructure limitations and slow internet connectivity [24]. Encouraging SMEs to integrate ICT into their operations for more sophisticated applications presents intricate challenges, including the imperative for technical prowess, substantial investments, and organizational adjustments, which can pose financial burdens for these enterprises [25]. The adoption of ICT unfolds in three distinct stages: pre-adoption, adoption, and post-adoption [26]. During the pre-adoption phase, novel technologies are evaluated, with a focus on immediate benefits. The adoption phase involves meticulous planning for technology acquisition and utilization. In the post-adoption phase, the continuous utilization or potential abandonment of the technology is considered. Various ICT tools, including email, websites, e-commerce platforms, e-business models, and innovative organizational structures, come into play across these stages.

Research Methods

The main objective of this study is to explore the key success factors and barriers to ICT adoption in SMEs through a quantitative descriptive research approach. The research design is organized, starting from the identification and formulation of research problems hypothesis through an extensive review of existing literature, by organizations such as government agencies, NGOs, software companies, insurers, and academic institutions, by employees, managers, owners, and debtors' involvement. Next,

data analysis is an important process in which various statistical tools are used to summarize and organize the data. The descriptive analysis includes such factors as the mean and standard deviation, while the chi-square tests examine the relationship between the independent variables and the dependent variable, "Use of ICT in SMEs" They walk Cronbach alpha analysis so ensured reliability and validity. Factor analysis is performed to find patterns and underlying relationships in data, with Kaiser-Meyer-Olkin (KMO) and Bartlett tests assessing the suitability of data for factor analysis. Principal Component Analysis (PCA) is used for dimension reduction with data exploration, and Rotated Component Matrix Variance (RCMV) describe relationships among variables.

Analysis and Findings

The data collected from the questionnaire survey were analyzed using Excel and IBM SPSS Statistics version 25.0. Descriptive statistics were employed to gain insights from the responses. In terms of respondent gender distribution, the majority (82.8%) were male, with female respondents accounting for 17.2%. Regarding the distribution of respondents based on their organizations, the largest group (39.4%) represented academic institutions, while the smallest group (1.4%) was associated with the automobile sector. These descriptive statistics provide a clear picture of the gender and organizational diversity among the survey participants.

Variables and components codes

All the variables and their components considered are coded for the computational easiness. The codes and its meaning are as per the following (Table 1).

Reliability analysis

For the reliability analysis, the Cranach's alpha value is calculated. The overall Cronbach's alpha value is summarized in table below (Table 2). Factors are acceptable if the value of alpha is greater than 0.7. Here, in the above table, we see that the Cronbach's alpha calculated is 0.864. It means, all the factors are acceptable. The result shows that the internal uniformity of questionnaire is good and strength of association is also good. The reliability test is done for each variable also. The Cronbach's alpha value for each variable is summarized in below table. From the above table, the alpha value of each variable is greater than 0.7 which means that all the factors are acceptable. Similarly, the alpha value for all items is 0.921 (greater than 0.7), hence all the items considered are consistent and acceptable (Table 3).

Kaiser-Meyer-Olkin measure of sampling adequacy for acceptance of parameters

This measure varies between 0 and 1, and values closer to 1 are better. A value of 0.6 is suggested minimum. For this research value obtained is 0.909 as shown in table below (see table 9) which is closer to 1 i.e. the research accepts entire success factors and barriers for the study (Table 4).

Bartlett's test of sphericity

This tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is matrix in which all of the diagonal elements are 1 and all off diagonal elements are 0. Small values less than 0.05 of the significance level indicate factor analysis is useful for the collected data. From the table 9, the significance level has low value than 0.005 and the factor analysis is useful for the collected data. The p-value is 0.000 (less than 0.05) which indicates that the factor loading is justified.

Principal component analysis for categorization of factors

PCA is used as a data analysis tool for making predictive models. It visualizes genetic distance and relatedness between populations. PCA can be done by eigen value decomposition of a data covariance (or correlation) matrix. Principal Component Analysis (PCA) is the process of data reduction or dimension reduction. For this research PCA is done through SPSS. From the factor analysis the data is converted into six principal components as shown in below (Table 5). The different factors are categorized in same components (factor loading) for those factors having significant factor loading value greater than 0.3 (Table 6).

Total variance explained (TVE)

The % of Variance column gives the ratio, expressed as a percentage, of the variance accounted for each component to the total variance in all of the variables. The first component will always have the highest variance (and hence have the highest eigenvalue), and the next component will have as much of the left over variance as it can, and so on. Hence, each successive component will account for less and less variance. The result obtained for this study can be seen in table 6 below:

Varimax rotation

A varimax rotation simplifies the expression of a particular sub-space in terms of few major items. The actual coordinate system is unchanged. The alignment is on the basis of orthogonally. Varimax maximizes the sum of the variances of the squared loadings (squared correlations between variables and factors). All the coefficient will be either large or near zero, with few intermediate values.

Naming of components

Looking for similarity between items that load on a factor, the first component is named as "Component Related to Management and Leadership" that contributes about 33.52 % of the total variance explained. The second component is named as "Component Related to Internal Barriers" that contributes about 9.39% of the total variance explained. The third component is "Component Related to Security Concern" that contributes about 4.33% of TVE. The fourth component is "Component Related to External Barrier" that contributes about 3.93% of TVE. The fifth component is "Component Related to Cost" which contributes about 3.81% of TVE. Lastly, the sixth component is "Component Related to Policy" which contributes about 3.57% (Table 7) of TVE. The Eigen value of the six different components categorized using PCA and Varimax are seen to be greater than 1 (Table 8). It describes that all these components or factors are highly reliable. Moreover, the different factors are categorized in same components (factor loading) for those factors having significant factor loading value greater than 0.3.

Table 1: *Variables and components codes.*

Code	Variable Meaning
MS1	The top-level management should be highly supportive
MS2	Managers should settle the conflicts between employees about previous and new systems
MS3	Policies should be made by top management to use new system.
MS4	Top management must be committed and should allocate the resources required.
PT1	Team members should be cross functional and internal staffs should be involved.
PT2	Team members should have in-depth knowledge about business and should have technical expertise.
PT3	Team members should be involved in different stages of implementation.
PT4	Incentives should be given to the team members.
IR1	Organization and employees should be ready for the changes.
IR2	Trainings and re-skilling of IT work force is necessary.
IR3	Employees should be trained on the new system for day-to-day operations.
CM	Re engineering in every department (both people and operation level) and managing changes to the new system is critical for ICT implementation.
AT	Software testing several times before go-live is essential for ICT implementation.
IB1	Worker's resistance to the change does not help in ICT implementation.
IB2	The appearance of additional cost may be the cause to SMEs not to adopt ICT.
IB3	Adoption of ICT by SMEs is affected by the organization of the company.
IB4	Lack of technical (company infrastructure) and economic (budget) resources is the barrier to ICT implementation.
IB5	Use of ICT is affected by insufficient employees' motivation and lack of training to the employees.
IB6	Inability of a company to make use of IT systems is due to communication problems.
IB7	Lack of support from top management is the barrier to ICT implementation.
IB8	Conflict between employees and project members about the new IT system is a barrier to adopt ICT.
IB9	Lack of awareness about the benefits of ICT affects the ICT implementation in SMEs.

EB1	Change in customer's requirements discourages managers/owners to implement ICT in their company.]
EB2	The insufficient support from major suppliers/ vendors affects the use of ICT.
EB3	The security of information or data is the major threat for ICT usage in SMEs.
EB4	Business partners, suppliers and customers do not make use of ICT.
EB5	The lack of access to ICT infrastructure (electricity, telephone, etc) causes SMEs not to use ICT tools.
EB6	Strict government policies about ICT discourages to use ICT in SMEs.

Table 2: *Overall Reliability Analysis.*

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.864	0.872	7

Table 3: *Reliability analysis of each independent variable.*

Code	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
MS	0.727	0.742	4
PT	0.787	0.787	4
IR	0.731	0.735	3
IB	0.831	0.834	9
EB	0.774	0.778	6
All	0.921	0.925	28

Table 4: *KMO and Bartlett's Test.*

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.909
Bartlett's Test of Sphericity	Approx. Chi-Square	2558.548
	Df	378
	Sig.	0.000

Table 5: *Rotated component matrix.*

Rotated Component Matrix[a]							
	Component						
Code	1	2	3	4	5	6	Remarks
MS1	0.791	0.014	-0.114	0.252	0.140	0.133	
IR2	0.720	0.201	0.068	0.097	0.173	-0.156	
PT4	0.700	0.079	0.103	-0.051	0.166	0.153	
PT1	0.668	0.222	0.247	0.017	0.027	-0.039	

MS4	0.651	0.209	0.016	0.116	0.017	0.203	Component 1
PT3	0.646	0.167	0.176	-0.024	0.003	0.380	
PT2	0.639	0.286	0.135	0.072	-0.309	-0.082	
IR1	0.637	0.180	0.077	0.162	0.231	-0.134	
MS2	0.630	0.090	0.000	0.125	0.141	-0.293	
AT	0.626	0.035	0.164	-0.070	0.341	-0.063	
IR3	0.582	0.296	0.319	-0.192	-0.078	-0.045	
CM	0.581	0.063	0.342	0.111	0.196	0.068	
IB7	0.256	0.748	-0.058	0.165	0.151	0.109	Component 2
IB8	0.040	0.672	0.167	0.281	0.181	-0.042	
IB5	0.273	0.610	0.167	0.018	0.333	0.088	
IB6	0.150	0.610	0.341	0.077	-0.057	0.195	
IB4	0.259	0.469	0.240	0.235	0.121	0.045	
IB9	0.310	0.440	0.332	0.189	0.248	-0.185	
EB1	0.073	0.209	0.764	0.228	0.062	0.064	Component 3
IB3	0.220	0.160	0.539	0.139	0.261	0.205	
EB3	0.387	0.192	0.527	0.149	0.177	-0.318	
EB5	0.075	0.249	0.093	0.778	0.069	0.071	Component 4
EB6	0.096	0.141	0.226	0.696	0.071	-0.151	
EB4	-0.048	0.125	0.505	0.515	0.025	0.247	
EB2	0.327	0.221	0.377	0.388	0.264	0.053	
IB2	0.199	0.168	0.201	0.205	0.671	0.086	Component 5
IB1	0.163	0.319	0.086	0.027	0.668	0.111	
MS3	0.269	0.165	0.149	0.007	0.185	0.711	Component 6
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.							
a. Rotation converged in 8 iterations.							

Table 6: *Total Variance Explained.*

Total Variance Explained									
Code	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
MS1	9.386	33.523	33.523	9.386	33.523	33.523	5.993	21.402	21.402
MS2	2.631	9.397	42.920	2.63	9.397	42.920	2.96	10.578	31.980

				1			2		
MS3	1.213	4.332	47.251	1.213	4.332	47.251	2.412	8.614	40.594
MS4	1.101	3.932	51.183	1.101	3.932	51.183	2.035	7.266	47.861
PT1	1.068	3.813	54.996	1.068	3.813	54.996	1.767	6.309	54.170
PT2	1.001	3.577	58.573	1.001	3.577	58.573	1.233	4.403	58.573
PT3	0.938	3.349	61.922						
PT4	0.849	3.034	64.956						
IR1	0.783	2.798	67.754						
IR2	0.749	2.676	70.429						
IR3	0.719	2.568	72.997						
CM	0.681	2.431	75.428						
AT	0.639	2.283	77.711						
IB1	0.614	2.193	79.905						
IB2	0.600	2.143	82.048						
IB3	0.552	1.972	84.020						
IB4	0.503	1.795	85.815						
IB5	0.490	1.750	87.565						
IB6	0.473	1.689	89.254						
IB7	0.440	1.572	90.826						
IB8	0.409	1.460	92.286						
IB9	0.391	1.397	93.683						
EB1	0.375	1.340	95.023						
EB2	0.341	1.219	96.242						
EB3	0.316	1.129	97.370						
EB4	0.271	0.967	98.337						
EB5	0.254	0.907	99.245						
EB6	0.211	0.755	100.000						
Extraction Method: Principal Component Analysis.									

Table 7: *Naming of the Components. Component Related to Management and Leadership*

Code	RCMV	TVE (%)
MS1	0.791	33.52
IR2	0.720	
PT4	0.700	
PT1	0.668	
MS4	0.651	
PT3	0.646	
PT2	0.639	
IR1	0.637	
MS2	0.630	
AT	0.626	

IR3	0.582	
CM	0.581	

Component Related to Internal Barriers

Code	RCMV	TVE (%)
IB7	0.748	9.39
IB8	0.672	
IB5	0.610	
IB6	0.610	
IB4	0.469	
IB9	0.440	

Component Related to Security Concern

Code	RCMV	TVE (%)
EB1	0.764	4.33
IB3	0.539	
EB3	0.527	

Component Related to External Barriers

Code	RCMV	TVE (%)
EB5	0.778	3.93
EB6	0.696	
EB4	0.515	
EB2	0.388	

Component Related to Costs

Code	RCMV	TVE (%)
IB2	0.671	3.81
IB1	0.668	

Component Related to Policy

Code	RCMV	TVE (%)
MS3	0.711	3.57

Table 8: *Interpretation of output from exploratory factor analysis.*

Interpretation of output from exploratory factor analysis			
Categorizatio nof factors in Terms of Component for kSF and Barriers	**TVE(%)**	**List of key success factor and barriers**	**RCMV**
		MS1_The top level management should be highly supportive	**0.791**

		IR2_Trainings and re-skilling of IT work force is necessary.	**0.720**
		PT4_Incentives should be given to the team members.	**0.700**
		PT1_Team members should be cross functional and internal staffs should be involved.	**0.668**
		MS4_Top management must be committed and should allocate the resoureces required.	**0.651**
		PT3_Team members should be involved in different stages of implementation.	**0.646**
Component Related to Managemeentand Leadership	**33.52**		
		PT2_Team members should have in-depth knowledge aboutbusiness and should have technical expertise.	**0.639**
		IR1_Organization and employees should be ready for thechanges.	**0.637**
		MS2_Managers should settle the conflicts between employees about previous and new systems	**0.630**
		AT_Software testing several times before go-live is essential for ICT implementation.	**0.626**
		IR3_Employees should be trained on the new system for day to day operations.	**0.582**
		CM_Re engineering in every department (both people and operation level) and managing changes to the new system is critical for ICT implementation.	**0.581**
Componen t Related to Internal Barriers	**9.39**	IB7_Lack of support from top management is the barrier to ICT implementation.	**0.748**
		IB8_Conflict between employees and project members about the new IT system is a barrier to adopt ICT.	**0.672**
		IB5_Use of ICT is affected by insufficient employees motivation and lack of training to the employees.	**0.610**
		IB6_Inability of a company to make use of IT systems is dueto communication problems.	**0.610**
		IB4_Lack of technical (company infrastructure) and economic (budget) resources is the barrier to ICT implementation.	**0.469**
		IB9_Lack of awareness about the benefits of ICT affects theICT implementation in SMEs.	**0.440**
Component Related to Security Concern	**4.33**	EB1_Change in customer's requirements discourages managers/owners to implement ICT in their company.]	**0.764**
		IB3_Adoption of ICT by SMEs is affected by the organizationof the company.	**0.539**
		EB3_The security of information or data is the major threatfor ICT usage in SMEs.	**0.527**
Component Related to		EB5_The lack of access to ICT infrastructure (electricity,telephone, etc) causes SMEs not to use ICT tools.	**0.778**
		EB6_Strict government policies about ICT discourages to useICT in SMEs.	**0.696**

External Barriers	**3.93**	EB4_Business partners, suppliers and customers do not makeuse of ICT.	**0.515**
		EB2_The insufficient support from major suppliers/ vendorsaffects the use of ICT.	**0.388**
Component Related to Costs	**3.81**	IB2_The appearance of additional cost may be the cause toSMEs not to adopt ICT.	**0.671**
		IB1_Worker's resistance to the change does not help in ICTimplementation.	**0.668**
Component Related to Policy	**3.57**	MS3_Policies should be made by top management to use newsystem.	**0.711**

Table 9: *Reliability Analysis of identified components.*

Components	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
Component Related to Management andLeadership	0.904	0.905	12
Component Related to Internal Barriers	0.802	0.805	6
Component Related to Security Concern	0.654	0.658	3
Component Related to External Barriers	0.705	0.708	4
Component Related to Costs	0.641	0.650	2
Component Related to Policies	0.704	0.716	1

Reliability Analysis of Identified Components

Reliability test for the six grouped components is performed using SPSS. Cronbach's alpha test value is presented in (Table 9) below. The Cronbach's alpha value of all the components concludes the acceptance and reliability of components. Reliability of the four components is seen to be accepted (greater than 0.7) and for two components, the alpha value is greater than 0.6 which is questionable but can be used. Now, the implementation model that can be used to judge the success of ICT Implementation in SMEs can be developed on the basis of results obtained from the above analysis.

Findings

The findings of this research, based on the analysis of responses from 221 participants representing various SMEs in Kathmandu, reveal several key insights. It is noteworthy that a majority of the respondents (82.8%) were male, and the most represented sectors among respondents were academic institutions (39.4%) and software and hardware industries (22.6%). The reliability test, assessed using Cronbach's Alpha, indicated good internal consistency among the survey questions. Standardized values pointed to "Internal Readiness/Trainings" as the most critical success factor for ICT implementation, while "External Barriers" emerged as the most formidable obstacle. Further statistical tests, such as the Kaiser-Meyer-Olkin (KMO) and Bartlett's tests, affirmed the suitability of the data for factor analysis. Principal Component Analysis (PCA) was employed to extract six components, with the Total Variance Explained (TVE) computed for each. The reliability of these items, as measured by Cronbach's alpha, was found to be acceptable. Ultimately, these factors form the basis for developing models to enhance the effective use of IT in SMEs. Key success factors identified included top management support, team member motivation, IT staff training, change management, and software testing, while barriers included lack of IT benefits and data lack of security concerns (Figure 1).

Conceptual Model

The conceptual model developed according to the factors identified and using the new collection of factors is as follows:

Through rigorous research, this study has identified several key success factors and barriers for ICT adoption in SMEs. Importantly, success factors include top management support, motivating team members, IT staff training, re-engineering departments, thorough software testing these factors is key to successful adoption of IT and contributes significantly to SME success in this regard.

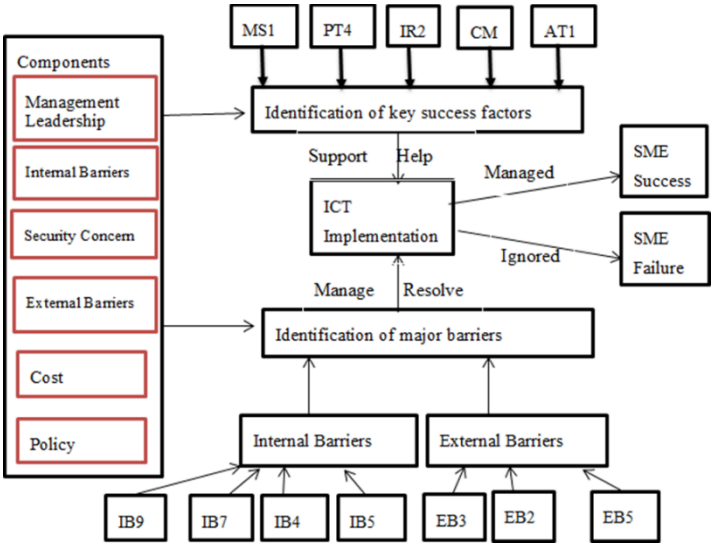

Figure 1: *Conceptual model developed by researchers.*

In contrast, lack of staff supports in markings, lack of knowledge, infrastructure constraints, low staffing, safety concerns, inadequate product/vendor support, information insufficient inclusion and penetration of information technology. They can fail. In addition, factors classified through principal component analysis (PCA) include management and leadership dimensions, internal barriers, security concerns, external barriers, cost considerations, and process factors.

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