CHAPTER III

RESEARCH METHODOLOGY

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INTRODUCTION

Research methodology is a certain method in which a systematic process of study such as determining the research design, sampling design, sources of data, area of the study, population, sampling frame, sampling method, sample size, data collection method and analyzing tools is being explained. This is the section where the validity of the instrument used and the reliability of the study can be determined. This is the crucial part of a study. Further parts of the study can be continued only if the validity and reliability of the study are statistically proven. The above said processes have been determined, proven and explained in this chapter.

3.1 AREA OF THE STUDY

Coimbatore is the nerve centre of MSMEs. Nowadays many technologies have been adopted in MSMEs like digital marketing, CRM, Cloud ERP and so on. Especially after the first lock down, adoption of Cloud ERP in MSMEs is flourishing. This helps in collecting samples. Area of study is fixed within Coimbatore district. Ganapathy, Saravanampatti, Thudiyalur, Sidhapudur, Gandhinagar, Gandhi Park, Thondamuthur, Sulur are some of the places where the data are collected.

3.2 RESEARCH DESIGN

In this study the trend in continuance intention in the usage of Cloud ERP is measured and also the demographic factors related to respondents and the factors related to organizations where the data to be collected also to be measured. Hence this study is descriptive in nature.

3.3 SOURCES OF DATA

i) Primary Data

Primary data are the data collected directly from the respondents for a study. The primary data used in this is a standardized structured questionnaire. Data are collected from the respondents who are already using Cloud ERP in various MSMEs in Coimbatore district.

Questionnaires in the form of Google forms are sent through emails and whatsapp to various respondents and also collected directly from the respondents by meeting them. Some Cloud ERP vendors helped to collect data from their clients. The period of the collection of data is from January 2021 to July 2021.

ii) Secondary Data

The data which are already gathered and stored before can be used for the present study as references are called secondary data. Here, many journals, databases, books, blogs, websites, information from the Cloud ERP vendors are used as the references for this study.

3.4 SAMPLING DESIGN

Sampling design defines which type of sampling method can be used for a study.

i) Population

All Cloud ERP users in the MSMEs in Coimbatore are the population considered for this study.

ii) Sampling Method and Sample Size determination

For this study, the respondents should be the people from MSMEs who have the knowledge and experience in using Cloud ERP. Multistage sampling method is used to collect the data. Initially to identify MSMEs who are using the cloud ERP system, the list of cloud ERP developers/vendors are collected from the local search engine 'Just Dial'. This is the first stage of data collection. In stage 2, five ERP vendors/developers who are operating in Coimbatore are selected randomly. In stage 3, from each of the ERP vendors, data are collected randomly from their clients. Sample size determination is tabulated as follows:

Table 3.1 - Sample Size Determination

Sources (Vendors)	Total No. of Clients	No. of Data Collected
eNoah SAP Business One Partner	510	187
Freedom Software Solutions Pvt Ltd	346	83

Global Software Solutions	214	87
IT to All	267	76
Roadmap IT Solutions	468	103
Total	1805	536

Data Collection Method

The instrument used in this study is a standard questionnaire (Cheng (2018, 2020), Byungchan Ahn and Hyunchul Ahn (2020) and Leow (2016)) which is used for the study to collect the data from the MSMEs of Coimbatore. The questionnaire is splitted into three parts. Part- 1 consists of the basic information of the organization where the data is collected. Part- 2 is the basic information of the respondents who have participated in this study. Part- 3 of the questionnaire includes the determinants of the continuance intention of Cloud ERP in MSMEs. Total of 49 statements are included regarding the variables information quality, system quality, environmental context, cost effectiveness, cloud security & data privacy, perceived ease of use, expected performance, perceived usefulness and continuance intention.

Variables Used in the Study

Variables drive the whole research process.by deciding the cause and effect in a research. In this study mainly two variables namely independent and dependent variables are used. The variable which is being measured in a research and which cannot be altered is called a dependent variable. Here in this study the dependent variable is continuance intention. Variables which can be controlled to check the impact on other variables are called independent variables. These variables have a direct effect on the dependent variable. For this study, based on the extensive literature reviews, information quality, system quality, perceived usefulness, cost effectiveness, environmental context, cloud security & data privacy, perceived ease of use and expected performance are selected as the independent variables. Each variables/constructs are measured as a set of statements/items. Each statement is measured in 5-point Likert scale. Both dependent and independent used in this study are tabulated as follows:

Table 3.2 - Variables Used in the Study

Author	Year	Independent Variables	Dependent Variable
Cheng	2020	Perceived usefulness, expected performance, perceived ease of use	Continuance Intention
Cheng	2019	Information quality, system quality	
Leow et. al	2016	Cloud security & data privacy, environmental context, cost effectiveness	

3.5 PILOT STUDY

Pilot study is the miniature of the original study. Pilot study is being done to check whether the study is on the right path. If any alteration needed in the study can be done in this phase. Validity and reliability of the research instrument, here it is the standard questionnaire can be tested in this phase and can be developed if necessary. Research protocol can be assessed as well as the sampling frame and sampling technique can be cleared in this miniature study (Edwin 2002) and all these help the main study error free.

In this study 110 samples are collected from various MSMEs in Coimbatore and are analyzed. The result of the pilot study has been verified with experts. Based on their suggestion, more reviews based on the continuance intention of the usage of cloud ERP in MSMEs are added.

3.6 DETERMINATION OF VALIDITY:

Validity of the Instrument used for the study

Validity is the method which assesses the accuracy of a research instrument used in a research. This can be assessed through various methods called content validity, construct validity, convergent validity, discriminant validity and so on. In this study content validity, construct validity, discriminant validity have been assessed and which is explained as follows:

3.6.1 Content Validity

Content validity is a subjective measure which is assessed from the view and knowledge of the experts in the particular subject of the study (Zhang et.al, 2000). In this study it has been assessed by the Cloud ERP software experts, academicians and Cloud ERP vendors. As per their suggestion variables benefits and barriers are removed, the word 'company' is replaced with 'organization' and the construct 'cost effectiveness' has been added as this factors helps to know whether the MSMEs are capable of adopting this software.

3.6.2 Construct Validity

Construct Validity assesses the accuracy of the translation of theory into actual measures. Construct validity can be fixed using Confirmatory Factor Analysis (CFA). In this study various constructs and items are taken from various articles (Cheng, 2020 and 2019) and (Leow, 2016) and hence construct validity is measured here. The analysis and interpretation is elucidated below:

Table 3.3 - Confirmatory Factor Analysis (CFA)

Indices	Values	Suggested Values
No. of Statements before CFA	49	
Chi- Square Value	3687.611	
DF	998	
Chi- Square/DF	3.695	< 5.00 (Hair et.al, 1998)
P Value	0.000	≤ 0.000 (Sebastian et.al, 2019)
GFI	0.779	<0.90 (Wang et.al, 2019, Shelvi and Miles, 1997)
AGFI	0.750	<0.90 (Wang et. al, 2019)
NFI	0.885	<0.90 (Wang et. al, 2019)
CFI	0.913	> 0.90 (Daire et.al, 2008)
RMR	0.037	< 0.08 (Hair et. al, 2006)
RMSEA	0.071	< 0.08 (Hair et. al, 2006)
No. of Statements after CFA	47	

Wang et. al (2019) suggested that GFI, AGFI and NFI values change as per the sample size. Hence if all the other values are fit even if these values are less than 0.9, the confirmatory factor analysis is assessed.

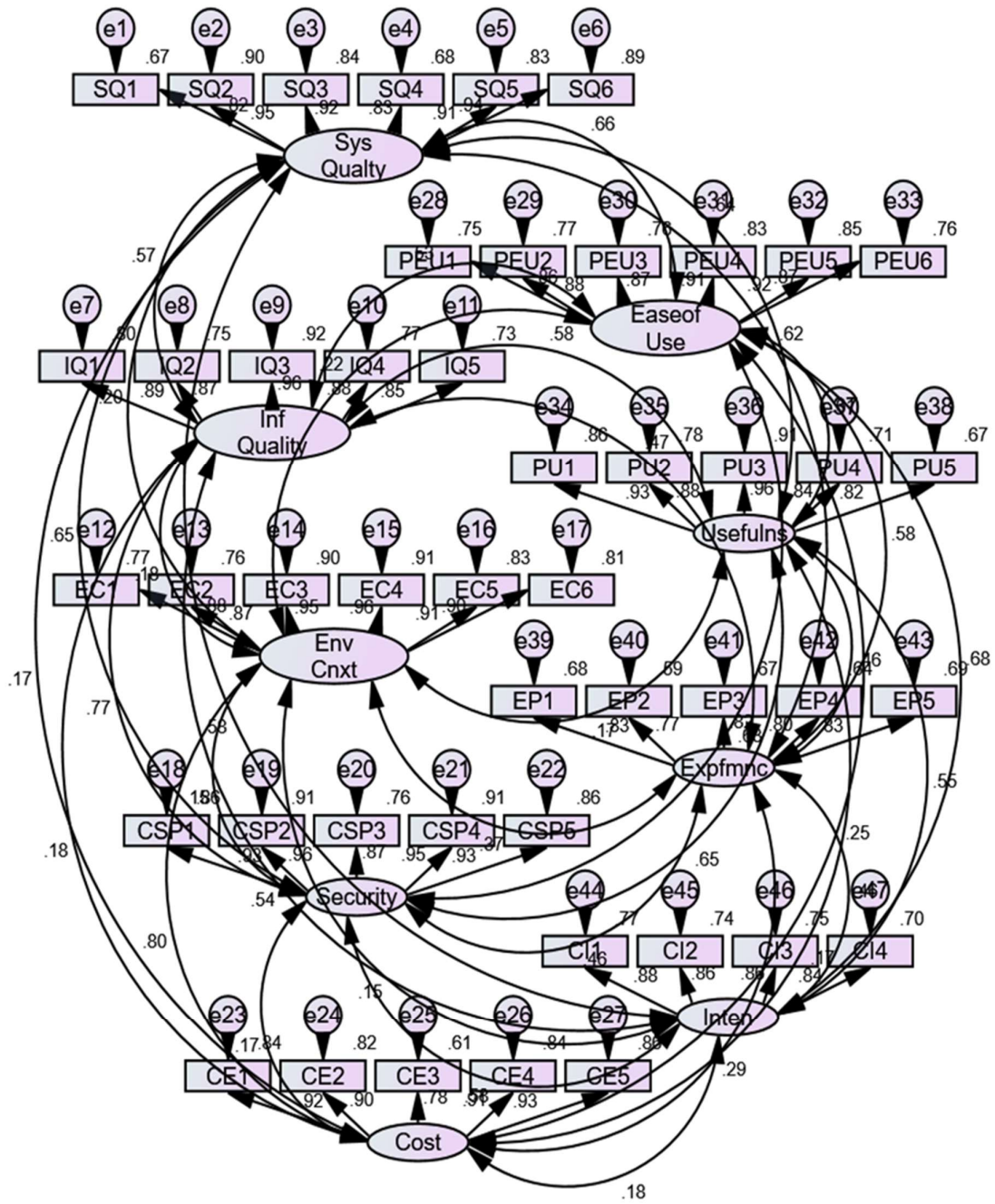**Figure 3.1 – Confirmatory Factor Analysis**

Table 3.4

Calculation of Average Variance Extracted (AVE) and Composite Reliability (CR)

			Factor Loading (FL)	Item Reliability (IR)	AVE	Delta	FL Square	Sum of FL Square	Sum of Delta	Composite Reliability (CR)
SQ1	←	SQ	0.820	0.672		0.328	0.672			
SQ2	←	SQ	0.949	0.901		0.099	0.901			
SQ3	←	SQ	0.918	0.843		0.157	0.843			
SQ4	←	SQ	0.826	0.682		0.318	0.682			
SQ5	←	SQ	0.914	0.835		0.165	0.835			
SQ6	←	SQ	0.943	0.889	0.804	0.111	0.889	0.88	0.111	0.889
IQ1	←	IQ	0.894	0.799		0.201	0.799			
IQ2	←	IQ	0.868	0.753		0.247	0.753			
IQ3	←	IQ	0.958	0.918		0.082	0.918			
IQ4	←	IQ	0.877	0.769		0.231	0.769			
IQ5	←	IQ	0.852	0.726	0.793	0.274	0.726	0.726	0.274	0.726
EC1	←	EC	0.878	0.771		0.229	0.771			
EC2	←	EC	0.869	0.755		0.245	0.755			
EC3	←	EC	0.950	0.903		0.098	0.903			
EC4	←	EC	0.956	0.914		0.086	0.914			
EC5	←	EC	0.913	0.834		0.166	0.834			
EC6	←	EC	0.902	0.814	0.832	0.186	0.814	0.814	0.186	0.814
CSP1	←	CSP	0.926	0.857		0.143	0.857			
CSP2	←	CSP	0.956	0.914		0.086	0.914			
CSP3	←	CSP	0.874	0.764		0.236	0.764			
CSP4	←	CSP	0.954	0.910		0.090	0.910			
CSP5	←	CSP	0.930	0.865	0.862	0.135	0.865	0.865	0.135	0.865
CE1	←	CE	0.918	0.843		0.157	0.843			
CE2	←	CE	0.904	0.817		0.183	0.817			
CE3	←	CE	0.781	0.610		0.390	0.610			
CE4	←	CE	0.914	0.835		0.165	0.835			

CE5	←	CE	0.929	0.863	0.794	0.137	0.863	0.863	0.137	0.863
PEU1	←	PEU	0.863	0.745		0.255	0.745			
PEU2	←	PEU	0.876	0.767		0.233	0.767			
PEU3	←	PEU	0.874	0.764		0.236	0.764			
PEU4	←	PEU	0.910	0.828		0.172	0.828			
PEU5	←	PEU	0.923	0.852		0.148	0.852			
PEU6	←	PEU	0.869	0.755	0.785	0.245	0.755	0.755	0.245	0.755
PU1	←	PU	0.927	0.859		0.141	0.859			
PU2	←	PU	0.881	0.776		0.224	0.776			
PU3	←	PU	0.956	0.914		0.86	0.914			
PU4	←	PU	0.841	0.707		0.293	0.707			
PU5	←	PU	0.818	0.669	0.785	0.331	0.669	0.669	0.331	0.669
EP1	←	EP	0.826	0.682		0.318	0.682			
EP2	←	EP	0.767	0.558		0.412	0.558			
EP3	←	EP	0.816	0.666		0.334	0.666			
EP4	←	EP	0.801	0.642		0.358	0.642			
EP5	←	EP	0.828	0.686	0.653	0.314	0.686	0.686	0.314	0.686
CI1	←	CI	0.876	0.767		0.233	0.767			
CI2	←	CI	0.860	0.740		0.260	0.740			
CI3	←	CI	0.864	0.746		0.254	0.746			
CI4	←	CI	0.839	0.704	0.739	0.296	0.704	0.704	0.296	0.704

A good rule of thumb is an AVE of 0.5 or higher indicates adequate Convergent Validity. An AVE of less than 0.5 indicates that an average, there is more error remaining in the items than there is variance explained by the latent factor structure you have imposed on the measure.

The rule of thumb for a Construct Validity estimate is that 0.7 or higher suggests good reliability. Reliability between 0.6 and 0.7 may be acceptable provided that other indicators of a model's construct validity are good. A high construct reliability indicates that consistency exists. This means all the measures are consistently representing something.

Table 3.5 - Discriminant Validity

Factors	Squared Interconstruct Correlation (SIC)									AVE
	SQ	IQ	EC	CSP	CE	PEU	PU	EP	CI	
SQ	-	0.331	0.041	0.421	0.027	0.436	0.403	0.379	0.339	0.804
IQ	0.331	-	0.032	0.598	0.031	0.283	0.339	0.226	0.288	0.793
EC	0.041	0.032	-	0.023	0.634	0.648	0.030	0.134	0.024	0.832
CSP	0.421	0.598	0.023	-	0.028	0.393	0.425	0.212	0.341	0.862
CE	0.027	0.031	0.634	0.028	-	0.064	0.029	0.081	0.031	0.794
PEU	0.436	0.283	0.648	0.393	0.064	-	0.378	0.335	0.468	0.785
PU	0.403	0.339	0.030	0.425	0.029	0.378	-	0.212	0.306	0.785
EP	0.379	0.226	0.134	0.212	0.081	0.335	0.212	-	0.213	0.653
CI	0.339	0.288	0.024	0.341	0.031	0.468	0.306	0.213	-	0.739

All the Average Variance Extracted (AVE) estimates in the above table are larger than the corresponding Squared Interconstruct Correlation (SIC) estimates. This means the indicators have more in common with the construct they are associated with than they do with other constructs. Therefore the CFA model demonstrates Discriminant Validity.

3.7 RELIABILITY ANALYSIS OF THE CONSTRUCTS

Reliability analysis is the measurement of interdependability and consistency of each construct. The following table depicts the reliability analysis of this study

Table 3.6

S. No.	Constructs	Cronbach Alpha Values
1	System Quality	0.961
2	Information Quality	0.947
3	Environmental Context	0.967
4	**Cloud Security & Data Privacy**	**0.969**
5	Cost Effectiveness	0.949
6	Perceived Ease of Use	0.956
7	Perceived Usefulness	0.947
8	Expected Performance	0.903
9	Continuance Intention	0.919
10	Overall reliability of the instrument	0.966

From the above table, Cronbach alpha values of all the constructs are above 0.7 (Nunnally 1978). This proves that the instrument used for the study is more reliable. All the values of Cronbach alpha are above .90 as same as the study on the continuance usage of cloud ERP by Cheng 2018. The Cronbach alpha value of the construct cloud security & data privacy (.969) is the highest when compared to the other constructs. The overall reliability of the instrument is 0.966.

Analyzing Tools Used in the Study:

1. Percentage Analysis

2. Chi- Square

3. ANOVA

4. Correlation

5. Regression

6. Structural Equation Modeling

All the above analysis has been done and interpreted in the fifth chapter.

SUMMARY

This chapter explains the type of research design used for the study, sources from which the primary and secondary data are collected, how the population and sample size are determined, type of sampling method which helps in collecting data and method of data collection. Validity of the instrument is tested. Reliability of each variable and overall reliability of the instrument is measured from the Cronbach alpha values. The following chapter includes all the analysis and interpretation of the study.