Multivariate Analysis: Investigating the Adoption of Customer Relation Management System among the Business Establishments in Butuan City, Philippines

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Abstract

The purpose of this study was to determine the usefulness of different types of multivariate analyses in predicting CRM system adoption among selected commercial establishments in Butuan City, Philippines. The researchers employed the Technology Acceptance Model (TAM), and the Technology-Organization-Environment (TOE) were used as independent variables, the Diffusion of Innovation (DOI) was used as a mediating variable, and respondents' profile was used as a moderating variable. The researchers generated empirical data for both descriptive and correlational analyses by utilizing the Multiple Regression Analysis (MRA) model, Hierarchical Regression Analysis (HRA) moderation, Hierarchical Regression Analysis (HRA) mediation analysis, and Analysis of Variance (ANOVA) techniques. The researchers were able to collect 148 responses out of 1,765 registered business establishment in Butuan City, and data were treated with different type of statistical tools. The descriptive information about CRM system acceptance using technology-organization-environment framework, most of the business establishments responses are verbally interpreted as "acceptable", while the features of CRM system such as compatibility, relative advantage, and complexity are verbally interpreted as "high" and the possibility of adopting CRM system is verbally interpreted as "influential" indicating that the factors included in technology adoption models are effective in projecting the intended results while most of the organizations agreed that CRM system can help them in improving their business performance while providing better customer service and customer relationship management. The results of ANOVA test showed that there are no significant differences on the assessment of the features of CRM system indicating that most of the respondents agreed that CRM system can have value in their business once it is implemented in their respective organization. The overall likelihood of CRM adoption among the business establishments showing R-squared of .863 indicating that the MRA model predicted 86 percent of the variance in technology adoption core contexts model that can explain factors influencing business establishments in Butuan City to implement CRM system as part of their marketing strategy. The HRA moderation model showed that the respondent' profile cannot moderate the relationship between the level of technology adoption contexts and the possibility of CRM system adoption showing new finding. The mediation analyses revealed that perceived features of the CRM system have no significant effect to the relationship between the level of technology adoption contexts and the possibility of CRM system adoption the finding contradict to the previous study where in the CRM system features can influence to adoption. The findings have practical implications for business owners considering CRM adoption as part of their marketing strategy. Though the researchers believed that this study has contributed a lot to the body of knowledge of CRM system adoption both in local and international context and were able to expand the TAM and TOE frameworks through adding constructs that are relevant to the study, the results of interpretations and analyses are still not enough because of limited sample size, limited coverage on target population, and some factors in technology acceptance models are not included in this study. Future

researchers may consider including the technology adoption classifications, the process of technology diffusion, system risks, and link it to the framework such as business performance.

Keywords: CRM; TAM; TOE; DOI; MRA;

1. Introduction

The rapid growth of technology has altered the global market landscape and has the potential to disrupt several industries' business structures (Wewege & Thomsett, 2020). The recent 2020 pandemic has driven practically all business sectors to embrace digital technology, which is now a requirement and integral component of core competence for adapting to changes in the environment and economy (Bhookhun, 2020), as well as adhering to government-mandated community quarantine policies (COVID-19 INTER-AGENCY TASK FORCE FOR THE MANAGEMENT OF EMERGING INFECTIOUS DISEASES RESOLUTIONS, 2020)

Digital transformation and technology advancement are reshaping business sectors (Wewege & Thomsett, 2020) Mobile marketing has established itself as a vital tool for many firms looking to leverage various social media channels to sell their online services and products (Leite & Azevedo, 2017). The mobile marketing includes customer relationship management (CRM) which is part of promotional strategy (Abbad, 2019). CRM system is a software solution that automates the manual process of customer relationship management (Helgeson, 2017). The CRM system had undergone an evolution process and was embedded as an important module in the Enterprise Resource Planning (ERP); however, ERP is an expensive system (Sumner, 2014). The high cost of adopting a CRM system was resolved and is now developed into a standalone system, and apps accessible on the internet, google play store, and apps store. The new mobile marketing software has enabled small businesses to adopt it because it is now affordable and simple to use, thereby increasing their sales profitability by connecting to a larger number of clients and allowing for cost savings. Indeed, the innovative software has improved the productivity and effectiveness of virtually every sort of company.

The researchers are interested in determining the possibility of businesses in Butuan City, Philippines, adopting CRM systems. Butuan City, Philippines consists of 1,765 business establishment as of 2018 (PhilAtlas, 2022). Using a combination of technology adoption models: Technology Acceptance Model (TAM) (Davis, 1989), Technology-Organization-Environment Framework (Tornatzky, 1990), and some components of Diffusion of Innovation (DOI) (Tornatzky, 1990) to understand the mediation effect, and finally, including respondents' profiles to identify model moderation. The findings of this study contributed new insights, conclusions, suggestions, and innovation to the body of knowledge.

2. Related Literature

Selecting the appropriate theories for conducting study is essential for quantitative research so it can build and develop a robust model. This study had anchored to the following theories:

The Technology Acceptance Model (TAM) (Davis, 1989) was formed by considering the external circumstances that influence an individual's decision to define technology acceptance and usage requirements. "Perceived usefulness" and "perceived ease of use" are two critical antecedents to an individual's attitude toward utilizing a system; once the system's usefulness is established, behavioural intention to use the system.
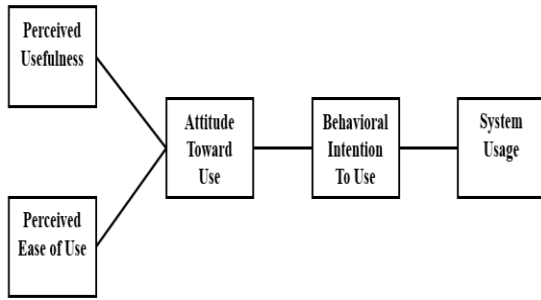
Figure 1 Technology Acceptance Model

"Technology-Organization-Environment" (TOE) (Tornatzky, 1990) concept had been shown to be useful in predicting technology adoption and studying the aspects that contribute to a company's acceptance and use of the system. Additionally, the authors said that the TOE framework is adaptable and may be utilized to construct a research model for determining the relationship between the core context of technology adoption and the degree of influence of technology adoption.
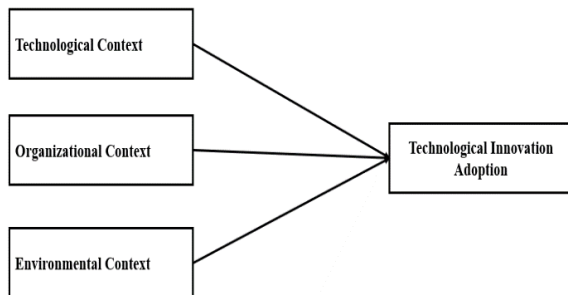

Figure 2 – TOE Framework

The "Diffusion-Of-Innovation" (DOI) (Rogers, 2003) described the rate of spread of new technology to the individual and community will be determined by three key "features" that influence individual decision-making, and the "perceived characteristics" of the new technology, both of which will go through many stages until total diffusion is achieved see figure 3 for details.
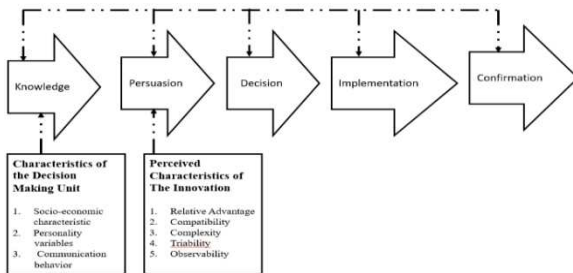

Figure 3 – DOI Framework

In this study, the researchers only selected some perceived characteristics of the innovation to determine if it has a mediating effect on the correlation between the model of technology acceptance and the possibility of adoption of a CRM system.

3. Conceptual Framework:

The study had anchored to the research frameworks ((Chui-Yu & Chen, 2017; Gnoufougou, 2017) with empirical evidence, however in this study the mediating variable is the perceived characteristics of CRM system as assessed by the respondents, the profile of business establishment in terms of size, type of business, and years in operation, and the likelihood of CRM system adoption as the dependent variable.
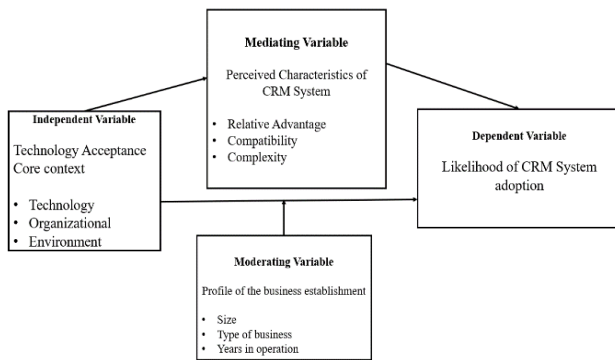
4. Methods

The researchers employed the descriptive-correlation research design, descriptive statistics help the researchers performed analysis to measure and interpret the results about the level of technology acceptance model, the extent of perceived characteristics about the CRM system, and the level of possibility of CRM system adoption. It was correlational because the researcher applied the multivariate statistical tools to establish the significant relationship between the level of technology acceptance model and level of possibility of CRM system adoption, significant differences when the technology acceptance models are group according to respondents' profile, mediating effect of perceived characteristics of CRM system to the relationship between the technology acceptance model and possibility of CRM system adoption, and moderating effect of respondents' profile to the relationship between the technology acceptance core context and possibility of CRM system adoption.

Population and sample: The population study is in Butuan City, Philippines and the regional centre, the commercial, industrial, and administrative centre of Caraga region, Philippines. The city's more than two thousand business establishments (SMEs, banks, finance cooperatives, pawnshops, etc.) registered in the Department of Trade and Industry are the respondents of this study.

Sampling technique: The study used the combination of purposive and convenience sampling methods. The purposive sampling method is a non-probability sampling technique to focus on the selected respondents identified by the Butuan City' Department of Trade and Industry (DTI). It used the convenience because only those respondents who were available during the survey were included.

Research Instruments: The researchers utilized the researchers-made questionnaire in gathering the feedback from the respondents. With the help of google form and social media platforms such as Facebook messenger, and google meet, the researchers collected enough samples and tested the questionnaire through Cronbach Alpha showing high internal consistency.

5. Results and Findings

Table 1 – Profile of Business Establishments in Butuan City, Philippines

Number of years in operation			Employee Size		
Years in Operation	Freq.	Pct.	Employee Size	Freq	Pct.
1 to 5 years	53	35.8	5	31	20.9
6 to 10 years	65	43.9	6-10	39	26.4
11 to 15 years	25	16.9	11-15	33	22.3
16 to 20 years	5	3.4	16-20	45	30.4
Total	148	100.0	Total	148	100.0

Business Type		
Type	Freq.	Pct.
Bank	12	8.1
Gas Station	10	6.8
Hospitality	60	40.5
SMEs	66	44.6
Total	148	100.0

The researchers were able to collect 148 responses from different types of respondents as shown in Table 1. Most of the respondents belongs to Small Medium Enterprise (SME) and Hospitality Industry.

Table 2 – Technology Acceptance Models and Perceived Characteristics of CRM system

CRM System Acceptance	Mean	Std Dev.	Research Anchor	Research Interpretation
Technology	3.17	0.49	Agree	Acceptable
Organization	3.14	0.50	Agree	Acceptable
Environment	3.22	0.50	Strongly Agree	Very Acceptable
Overall, TOE	3.18	0.46	Agree	Acceptable
Compatibility	3.18	0.68	Agree	High
Relative Advantage	3.26	0.65	Strongly Agree	Very High
Complexity	3.27	0.67	Strongly Agree	Very High
Overall, DOI	3.24	0.57	Strongly Agree	Very High
Overall, Likelihood	3.19	0.47	Agree	Influential

Table 3 – Test of Significant difference when Technology acceptance models are set according to business establishments' profile

ANOVA		Employee Size		Type of Business		Years in Operation	
Variables		F	Sig.	F	Sig.	F	Sig.
Technology	Between Groups	.757	.520	1.217	.306	1.003	.394
	Within Groups						
	Total						
Organization	Between Groups	1.592	.194	3.197	.025	1.018	.387
	Within Groups						
	Total						
Environment	Between Groups	1.117	.344	2.246	.086	1.571	.199
	Within Groups						
	Total						

Table 4- Test of Significant effect between Technology acceptance models and possibility of CRM system adoption

Model	Variable	B	Std. Error	t	p-value	VIF
1	(Constant)	.176	.102	1.723	.087	
	Technology	.285	.054	5.323**	.000	3.27
	Organization	.352	.059	5.973**	.000	4.08
	Environment	.312	.052	5.951**	.000	3.19
R =0.929 ; R2 =0.863 ;ΔR2= 0.860 ; Durbin-Watson =2.179 ; F=301.142** ; p-						

a. Predictors: (Constant), Environment, Technology, Organization
b. Dependent Variable: Likelihood
*Significant at 0.05 level of significance
**Significant at 0.01 level of significance

Table 5 – Test of moderating effect of business establishments' profile to the relationship between technology acceptance and likelihood of CRM system adoption

Moderating Variables	Coefficient	SE	t	p-value
Employee Size	-.137	.0272	-.502	.616
Type of Business	-.021	.0403	-.522	.602
Years in operation	-.040	.0411	-.987	.326

Note: ns. Not significant at 0.05 level of significance

Table 6- Test of mediating effect of business establishments' profile to the relationship between technology acceptance core context and likelihood of CRM system adoption

Antecedents	Consequent							
	M (PC)				Y (Likelihood)			
		Coeff.	SE	p		Coeff.	SE.	p
X (TACM)	a	-.18	.10	.07	c'	-.03	.025	.14
M(PC)					b	.94	.031	.00
Constant	i$_1$	3.8	.32	.00	i$_2$	.31	.141	.02
	R=.149 R²=.022; F (1, 146) =3.378; p-value <0.00*				R=.7836; R²=0.5903; F (2, 354) =255.01 p-value <0.00*			

PC =Perceived Characteristics about CRM system
TACM =Technology Acceptance Model about CRM system
**Significant at 0.01 level of significance
*Significant at 0.05 level of significance

Table 6 – Hypotheses Test

Hypothesis	Decision
There is no significant difference in the level of technology acceptance models of CRM system when set according to the business establishments' profile.	Not supported
The level of technology acceptance models of CRM system cannot significantly influence the possibility of adopting the CRM system.	Supported
The business establishment' profile cannot significantly moderate the correlation between the level of technology acceptance models and the possibility of CRM system adoption.	Not Supported
The perceived characteristics about the CRM system cannot significantly mediate the correlation between the level of technology acceptance models and the possibility of CRM system adoption.	Not Supported

6. Results and Findings

A study on the likelihood of CRM system adoption among business firms in Butuan City, Philippines, is now underway, and will apply models of technology acceptance, perceived CRM system attributes as a mediating variable, and respondents' profile as moderating variables. According to the study's findings, a range of factors, both significant and non-significant, influence CRM system adoption. The findings of this study pave the path for additional CRM system adoption studies. Further research should be conducted to ascertain any other factors affecting the adoption of CRM systems in business companies. According to the study's findings, the MRA model indicates that the fundamental contexts of technological acceptance, organizational acceptance, and environment acceptance are all major predictors of CRM system adoption. However, neither the business establishment's profile nor the perceived attributes of the CRM system have any effect on the relationship between technology acceptance models and the potential of adopting a CRM system.

The study contributes to the body of knowledge by finding many criteria that influence the possibility of business establishments adopting CRM systems. The study evaluated technology adoption in that environment, giving industry- and technology-specific insights that contribute to the filling of knowledge gaps. To synthesize disparate perspectives into a proposed adoption model, this study employs the TOE framework [10]. Perceived Characteristics [11] and technology acceptance model [9], this study hypothesizes that perceived characteristics about the CRM system act as a mediating variable, as do the technology acceptance antecedents (perceived usefulness, perceived ease of use), the organization acceptance antecedents (top management support). Finally, the study's uniqueness is proven by the disparities in findings and interpretations of significant outcomes, showing that the theoretical viewpoints underlying these three (3) aspects are genuine and may contribute to the expansion of the (TOE) framework.

7. Recommendation

The research findings added to the body of knowledge in this way by providing a more complete picture of the possibility of CRM system adoption among commercial firms in Butuan City, Philippines: The outcomes provided pertinent information on how to apply the CRM system to the other organization, which likewise requires a system capable of assisting them in boosting their business performance. The government agency

can contribute to the shift in how CRM systems are implemented in various organizations by improving training materials relevant to CRM system deployment. Owners and managers of commercial establishments: The study's findings have commercial implications for any industry owners and managers who would use a CRM system in their organization. It can assist decision-makers responsible for implementing information technology at various management levels. The study might shed light on how to effectively use CRM systems to boost organizational performance and exceed customer expectations. The Academic Community and the Next Generation of Researchers: The findings of the study will serve as academic baseline data for future research on CRM system adoption. Numerous studies on the adoption of technology in various types of industries have been conducted in a variety of geographic regions. However, little research is undertaken in a local setting, particularly in the Philippines' Butuan City. This study can benefit future researchers by analysing additional CRM system characteristics not covered in this study, applying different technological acceptability models, and examining the possibility of customer adoption of CRM.

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