

INFORMATION TECHNOLOGY ADOPTION IN BUSINESS MANAGEMENT

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ABSTRACT

The objective of the study is to identify the demand for information technology (IT) in business administration. Research data were collected by quota sampling with a sample size of 446 enterprises in Can Tho City. The results have pointed out factors that positively affect IT adoption in the management of enterprises including manager qualifications, labor quality, policies, competition, and the scale of customers and partners. Applying the logistic regression, the study has provided assumptions about the probability of IT adoption in business management: if the enterprise has high-quality labor resources, high-qualified managers, supportive policies, a large scale of customers and partners, and a high level of competition, the enterprise has high probability to apply IT in management. Among these, labor quality has the most influence on the demand for IT adoption in business management in Can Tho City.

Keywords: forecast, adoption, information technology, management, business

1. INTRODUCTION

In today's competitive environment, IT is one of the essential strategies that most enterprises apply to enhance their competitive advantage (Pinto et al., 2013; Soderholm & Norrbin, 2014). Information technology helps reduce business operating costs, improve the quality of new product development, integrate information exchange between partners in the supply chain, reduce reverse logistics, and improve operational efficiency (Love et al., 2014; Ali et al., 2012). Advances in IT have changed the way of doing business and managing supply chains (Cachon & Fisher, 2000). The adoption of IT helps enterprises stay competitive in the global market and achieve operational efficiency (Louadi, 1998; Ismail & King, 2005; Wang et al., 2016). Besides, information technology also helps enterprises make business decisions (Shin, 2001; Cragg et al., 2002; Temtime et al., 2003). Currently, the business community in Vietnam, especially in Can Tho City is racing in digital transformation and technology adoption to increase labor efficiency and save management costs. Most enterprises in Can Tho City have changed their management model from traditional to digital transformation. The adoption of IT in management has optimally changed the supply chain system of enterprises. However, many enterprises are not aware of the importance of IT adoption, so they still operate their businesses following traditional ways. This leads to limitations in the management and operation of all business activities. Therefore, this study was conducted to demonstrate factors affecting the demand for IT adoption in business management, thereby forecasting the desire for IT adoption in management in Can Tho City.

2. THEORETICAL FRAMEWORK AND RESEARCH MODEL

2.1 Theoretical framework

According to Daintith (2009), IT is a term that includes software, internet networks, and computer systems used for the distribution and processing of data, information exchange, and information storage. Information technology promotes a more effective information-sharing process. When the information is shared correctly and regularly updated, it improves the organization's competitiveness and operational sustainability (Ramakrishna, 2016; Ciccullo et al., 2018). In addition to this, IT helps improve methods and procedures for data collection, recording, analysis, synthesis, and presentation of financial statements (Unegbu, 2014), enhance efficiency and responsiveness of accounting information systems (Ismail & King, 2007; Mamić Sačer & Oluic, 2013; Taber et al., 2014). As presented by Kapurubandara & Lawson (2006), IT provides opportunities for organizations and provides solutions in an ever-changing environment. Information technology contributes to the competitive advantages of enterprises, identified as a key tool in management processes (Ion & Andreea, 2008).

2.2 Research hypothesis

Efforts in investing in IT are influenced by many factors such as enterprise scale (Lehman, 1985; Ghobakhloo et al., 2011), operational strategy (Colgate, 2000), and aspects of techniques, functions, and management information (Hart, 2006; Xiao et al., 2014). Human resources affect the decision to adopt IT in business management (Mahmood et al., 2001; Alam and Noor, 2009; Goyal et al., 2010; Hartono, 2012). According to Attom (2013), IT adoption in the management of an enterprise is influenced by the number of years of business, business type, and line of business. Moreover, Ghobakhloo et al. (2011) have shown that the Government's support policies and the market competition level affect the decision to apply IT in business management.

Based on the above literature review, the study has applied the group discussion (qualitative research) with five experts and five business administrators. The result sets out the following research hypotheses: H1: The enterprise scale positively affects IT adoption in business management. H2: Manager Qualifications have a beneficial impact on IT adoption in business management. H3: Labor quality positively influences IT adoption in business management. H4: Policies have a positive impact on the adoption of IT in business management. H5: The level of competition positively affects the decision to adopt IT in business management. H6: Customer and partner scale positively affects IT adoption in business administration. The research model is proposed as follows:

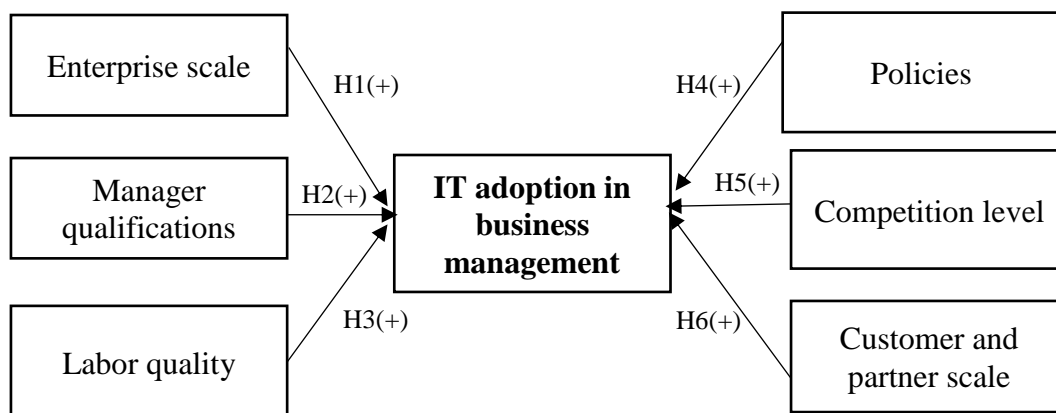


Figure 1: Proposed research model

3. RESEARCH METHODOLOGY

3.1 Analytical methods

To find out the demand for IT adoption of companies, the study applies binary logistic regression. Besides, the descriptive statistic uses standard deviation, mean, minimum, and maximum values to describe the characteristics of enterprises in the city of Can Tho.

3.2 Research data

The larger the sample size, the lower the error in analysis, and the more representativeness of the population. Richard (1985) suggested that the appropriate sample size for multivariate regression should be higher than the total number of independent variables by at least 50 units. According to Green (1991), and Tabachnick & Fidell (1996), the minimum sample size regression analysis is defined by the formula $50 + 8m$ (m : the number of independent variables). The research model includes 6 independent variables, so the minimum sample size should be 98 observations. The study uses quota sampling to collect data. The classification criteria include enterprise scale, the field of operation, business type, and operational efficiency. After collecting and filtering data, the study achieved a sample size of 446 enterprises. Thus, the sample size ensures statistical validity and is suitable for hypothesis testing.

4. RESEARCH RESULTS AND DISCUSSION

4.1 Characteristics of enterprises

Based on the statistics in table 1, most enterprises have a micro and small scale. Micro enterprises account for the highest proportion (in which, 54.81% of enterprises have IT adoption in management). Among medium and large enterprises, the proportion that has IT adoption in management (4.81%) is higher than the remaining group (2.52%). Regarding operating time, most enterprises do not have much seniority and experience in the market. This is reflected in the low operating time (1 to 10 years). Among enterprises from 1 to 5

years old, enterprises that do not have IT adoption in business management account for 35%. The other group accounts for over 32%. As for business type, most businesses are in the form of limited companies, of which about 70% of enterprises have IT adoption in management.

Table 1: Characteristics of enterprises

Characteristics	With IT adoption		Without IT adoption	
	Frequency	%	Frequency	%
Microscale enterprise	114	54.81	135	56.72
More than 10 years of operation	72	34.62	81	34.04
Business type (limited company)	146	70.19	165	69.32
Total capital (billion VND)	48.67	171.53	25.38	106.21
Fixed asset (billion VND)	15.68	56.28	12.05	51.09
Number of employees (person)	41.22	173.53	20.42	65.21
Direct labor (%)	82.65	25.12	80.76	26.23

The above table shows that the average charter capital of enterprises without IT adoption is about 26 billion VND, much lower than the charter capital of enterprises with IT adoption (49 billion VND). The total value of fixed assets of enterprises with IT adoption is 12 billion VND, while that of the other group is 15 billion VND. Regarding the labor structure, on average, each enterprise without IT adoption has 20 employees, while each enterprise with IT adoption has 41 employees. The main workforce is direct labor (about 83% for enterprises with IT adoption and 80% for those without IT adoption).

4.2 Factors impacting the decision to adopt IT in administration

Before testing the hypotheses, the Correlation test was performed to determine the degree of correlation between independent variables. The test results for all values are less than 0.8, so the multicollinearity can be ignored. The result of the binary logistic regression shows that: (1) the hypothesis test of the variable relevance reaches the Sig. = 0.00, so it is possible to completely reject the H_0 hypothesis. This means there exists a linear relationship between variables in the model and the decision to apply IT in business management; (2) the percentage correct of the model is 70.2%, which is a suitable rate for the binary regression model.

Table 2: Factors affecting IT adoption in business management

Variable	Estimated coefficient	P-value	Exp(B)
Constant	-8.851	0.000	0.000
Enterprise scale (X1)	0.072	0.609	1.074
Qualifications (X2)	0.449	0.005	1.567
Labor quality (X3)	0.761	0.000	2.140
Policies (X4)	0.419	0.005	1.520
Competition level (X5)	0.433	0.005	1.542
Customers and partner scale (X6)	0.417	0.022	1.517
Sig.			0.000
Percentage correct (%)			70.20

Based on the analytical result in table 2, out of 6 independent variables included in the model, 5 variables are statistically significant. That is, these 5 variables affect the decision to adopt IT in business administration, including qualifications of managers, quality of labor, policies, level of competition, and the scale of customers and partners. The “enterprise scale” variable is not statistically significant, which means that the scale of the enterprise does not affect the IT adoption process. If the manager has high qualifications, they will be fully aware of the necessity and usefulness of IT adoption. It promotes the demand and decision-making behavior to apply IT in the management system. Similarly, if the enterprise’s workforce is high-qualified, the operation of the IT system will be more convenient, and its implementation will be faster, thereby promoting the enterprise to apply IT in management. The practical support from the Government and local authorities helps businesses be more proactive in accessing new technologies, promoting the decision-making probability to apply IT in management. Besides, when enterprises are facing fierce competition in the market, the manager looks for ways to manage costs and resources, and IT adoption in management is an inevitable solution. This promotes enterprises to adopt IT in management. Besides, if enterprises have a large scale of customers and partners, traditional management is not helpful, negatively affecting customer care and partner relationships. Thus, the adoption of IT in management contributes to improving the quality of customer relationship management activities.

4.3 Demand for IT adoption in enterprise management

The study assumes P0: initial probability (5%), P1: changing probability, and eB where B is obtained from the logistic regression result (impact indicator B).

Table 3: Impact level of factors

Factor	B _i	e ^{B_i}
Labor quality	0.761	2.140
Qualifications	0.449	1.567
Policies	0.419	1.520
The level of competition	0.433	1.542
Customers and partner scale	0.417	1.517

Table 4: The percentage change in the probability of factors

Factor	P ₁ (%)	P ₁ -P ₀ (%)
Labor quality	10.1	5.1
Qualifications	7.6	2.6
Policies	7.4	2.4
The level of competition	7.5	2.5
Customers and partner scale	7.3	2.3

Labor quality

The factor of labor quality has the value of B₁ = 0.761, P₀ = 5%, eB₁ = 2.140.

$$P_1 = \frac{P_0 * e^{B_1}}{1 - P_0 * (1 - e^{B_1})} = \frac{0.05 * 2.140}{1 - 0.05 * (1 - 2.140)} = 0.101 = 10.1\%$$

Assuming the probability of applying IT in the management is initially 5%, in case other factors are constant, if the labor quality of the enterprise increases by 1 unit, the probability of IT adoption demand in business management will reach 10.1% (an increase of 5.1% compared to the initial probability of 5%). Thereby, it shows that high labor quality plays an essential role in promoting IT adoption in business management.

Manager qualifications

The factor of the manager qualifications has $B1 = 0.449$, $P0 = 5\%$, and $eB1 = 1.567$.

$$P1 = \frac{P_0 * e^{B1}}{1 - P_0 * (1 - e^{B1})} = \frac{0.05 * 1.567}{1 - 0.05 * (1 - 1.567)} = 0.076 = 7.6\%$$

Assuming the probability of applying IT in the management of the enterprise is initially 5%. In case other factors are constant, if the education level of the manager has 1 more school year, the probability of the demand for IT adoption in business management will reach 7.6% (increasing 2.6% compared to the initial probability of 5%). This concluded that if the level of the business owner is improved, IT adoption in business management will be more positive.

Policies

The supporting policies factor has $B1 = 0.419$, $P0 = 5\%$, and $eB1 = 1.520$.

$$P1 = \frac{P_0 * e^{B1}}{1 - P_0 * (1 - e^{B1})} = \frac{0.05 * 1.520}{1 - 0.05 * (1 - 1.520)} = 0.074 = 7.4\%$$

Assuming the initial probability of IT adoption is 5%, when other factors are constant, if policies that support enterprises increases by 20%, the probability of IT adoption in the enterprise will be 7.4% (increasing 2.4% compared to the initial probability of 5%). This proves that the support of the Government has a positive influence on the adoption of IT among enterprises.

Competition level

The factor of competition has $B1 = 0.433$, $P0 = 5\%$, and $eB1 = 1.542$.

$$P1 = \frac{P_0 * e^{B1}}{1 - P_0 * (1 - e^{B1})} = \frac{0.05 * 1.542}{1 - 0.05 * (1 - 1.542)} = 0.075 = 7.5\%$$

Assuming the initial probability of IT adoption is 5%, in case other factors are constant, if the competitive level of the enterprise increases by 20%, the probability of the demand for IT adoption will be 7.5% (increasing 2.5% compared to the initial probability of 5%). Thereby showing the significant role of the competition status for the adoption of IT in business administration.

Customer and partner scale

The factor of customer and partner scale has $B1 = 0.417$, $P0 = 5\%$, and $eB1 = 1.517$.

$$P1 = \frac{P_0 * e^{B1}}{1 - P_0 * (1 - e^{B1})} = \frac{0.05 * 1.517}{1 - 0.05 * (1 - 1.517)} = 0.073 = 7.3\%$$

Assuming the probability of IT adoption of the enterprise is initially 5%. When other factors are constant and if the scale of customers and partners increases by 20%, the probability of the demand for IT adoption in business management will be 7.3% (increasing 2.3% compared to the initial probability of 5%).

Forecast the IT adoption transformation

Based on table 2, the logistic regression equation is set up below.

$$\text{Ln (Odds)} = - 8.851 + 0.761X_2 + 0.449X_3 + 0.419X_4 + 0.433X_5 + 0.417X_6$$

The forecast equation of the logistic regression model is as follows:

$$E\left(\frac{Y}{X}\right) = \frac{e^{\text{Ln(odds)}}}{1 + e^{\text{Ln(odds)}}$$

Based on the above equation, the study predicts the demand for IT adoption of enterprises with the following assumptions: Business managers have university degrees, enterprises have high-quality labor resources, and support policies at level 4 (favorable), high level of competition in the market, and large size of customers and partners, the needs of IT adoption in business management are as follows:

Variable	X2	X3	X4	X5	X6	Constant
B	0.761	0.449	0.419	0.433	0.417	-8.851
Variable value	4	3	4	5	5	

With the above assumptions, this analysis result shows that the demand to adopt IT in business management reaches 81.24%.

Another assumption is that: The education level of the enterprise's manager is at the intermediate level or below, the enterprise has high-quality labor resources, support policies are at level 5 (very favorable), moderate level of competition in the market, and the average size of customers and partners, the demand for IT adoption in business management is as follows:

Variable	X2	X3	X4	X5	X6	Constant
B	0.761	0.449	0.419	0.433	0.417	-8.851
Variable value	3	1	5	3	4	

With the above assumptions, the analysis result points out that the need for IT adoption in management is 25.76%.

5. CONCLUSION

In general, the study has met the research objectives. The research results have proved that the factors positively influencing the decision to apply IT in the management of enterprises include manager qualifications, labor quality, support policies, level of competition, and the scale of customers and partners. Applying the logistic regression, the study has set assumptions about the probability of IT adoption in business management. If enterprises have high-quality labor resources, high-qualified managers, supportive policies, a large scale of customers and partners,

and a high level of competition, the probability of IT adoption in administration may increase. The research results are a useful scientific basis for business administrators to build strategies to improve competitiveness from IT adoption.

REFERENCES

1. Alam, S. S., & Noor, M. M. (2009). ICT adoption in small and medium enterprises: An empirical evidence of service sectors in Malaysia. *International Journal of Business and Management*, 4(2), 112-125.
2. Ali, N., Whiddett, D., Tretiakov, A. & Hunter, I. (2012). The use of information technologies for knowledge sharing by secondary healthcare organizations. *International Journal of Medical Informatics*, 81(7), 500-506.
3. Attom, B. E. (2013). The impact of information communication technology (ICT) on business Growth strategies of Small and Medium-Scale Enterprises (SMEs) in the Awutu-Senya East Municipality of Central Region of Ghana. *Asian Journal of Business and Management Sciences*, 3(2), 13-28.
4. Cachon, G. P., & Fisher, M. (2000). Supply chain inventory management and the value of shared information. *Management Science*, 46(8), 1032-1048.
5. Ciccullo, F., Pero, M., Caridi, M., Gosling, J., & Purvis, L. (2018). Integrating the environmental and social sustainability pillars into the lean and agile supply chain management paradigms: A literature review and future research directions. *Journal of cleaner production*, 172, 2336-2350.
6. Colgate, M. (2000). Marketing and marketing information system sophistication in retail banking. *The Service Industries Journal*, 20(1), 139-152.
7. Cragg, P., King, M., & Hussin, H. (2002). IT alignment and firm performance in small manufacturing firms. *The Journal of Strategic Information Systems*, 11(2), 109-132.
8. Daintith, J. (2009). *A Dictionary of Physics*. Oxford University Press.
9. Ghobakhloo, M., Sabouri, M. S., Hong, T. S., & Zulkifli, N. (2011). Information technology adoption in small and medium-sized enterprises; an appraisal of two decades literature. *Interdisciplinary Journal of Research in Business*, 1(7), 53-80.
10. Goyal, E., Purohit, S., & Bhagat, M. A. N. J. U. (2010). Factors that affect information and communication technology usage: A case study in management education. *Journal of information technology management*, 21(4), 38-57.
11. Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate behavioral research*, 26(3), 499-510.
12. Hart, V. A. (2006). Information technology sophistication and outcomes of acute care hospitals in Texas. Doctor of Philosophy, the University of Texas at Arlington, United States of America.
13. Hartono, J. (2012). Adoption of information technology on small businesses: The role of environment, organizational and leader determinant. *International Journal of Business, Humanities, and Technology*, 2(4), 60-66.
14. Ion, P., & Andreea, Z. (2008). Use of ICT in SMEs management within the sector of services. *The Journal of the Faculty of Economics-Economic, University of Oradea, Faculty of Economics*, 4(1), 481-487.
15. Ismail, N. A., & King, M. (2005). Firm performance and AIS alignment in Malaysian SMEs. *International Journal of Accounting Information Systems*, 6(4), 241-259.
16. Ismail, N. A., & King, M. (2007). Factors influencing the alignment of accounting information systems in small and medium-sized Malaysian manufacturing firms. *Journal of Information Systems and Small Business*, 1(1-2), 1-20.

17. Kapurubandara, M., & Lawson, R. (2006). Barriers to Adopting ICT and e-commerce with SMEs in developing countries: an exploratory study in Sri Lanka. University of Western Sydney, Australia, 82(1), 2005-2016.
18. Lehman, J. A. (1985). Organizational size and information systems sophistication. *Journal of Management Information Systems*, 11(3), 78-86.
19. Louadi, M. E. (1998). The relationship among organization structure, information technology, and information processing in small Canadian firms. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration*, 15(2), 180-199.
20. Love, P. E. D., Matthews, J., Simpson, I., Hill, A. & Olatunji, O. A. (2014). A benefits realization management building information modeling framework for asset owners. *Automation in Construction*, 37, 1-10.
21. Mahmood, M.A., Hall, L., Swanberg, D.L. (2001). Factors affecting Information Technology Usage: A Meta-analysis of the Empirical Literature. *Journal of Organizational Computing and Electronic Commerce*, 11(2), 107-130.
22. Mamić Sačer, I., & Oluić, A. (2013). Information technology and accounting information systems quality in Croatian middle and large companies. *Journal of information and organizational sciences*, 37(2), 117-126.
23. Pinto, R., Mettler, T. & Taisch, M. (2013). Managing supplier delivery reliability risk under limited information: foundations for a human-in-the-loop DSS. *Decision Support Systems*, 54, 1076-1084.
24. Ramakrishna, Y. (2016). Supply Chain Management: Large vs. Small and Medium Enterprises (SMEs). In *Innovative Solutions for Implementing Global Supply Chains in Emerging Markets* (pp. 141-151). IGI Global.
25. Richard, J. H. (1985). *A primer of multivariate statistics*. New York: Academic Press.
26. Shin, N. (2001). The impact of information technology on financial performance: the importance of strategic choice. *European Journal of Information Systems*, 10(4), 227-236.
27. Soderholm, P. & Norrbin, P. (2014). Information logistics for continuous dependability improvement. *Journal of Quality in Maintenance Engineering*, 20(3), 249-261.
28. Tabachnick, B. G., & Fidell, L. S. (1996). *Using Multivariate Statistics* (3rd ed.). New York: Harper Collins.
29. Taber, T. A. A., Alaryan, L. A., & Haija, A. A. A. (2014). The effectiveness of accounting information systems in Jordanian private higher education institutions. *International Journal of Accounting and Financial Reporting*, 4(1), 28-42.
30. Temtime, Z. T., Chinyoka, S. V., & Shunda, J. P. W. (2003). Toward strategic use of IT in SMEs: a developing country perspective. *Information Management & Computer Security*, 11(5), 230-237.
31. Unegbu, A.O. (2014). Theories of Accounting: Evolution & Developments, Income Determination, and Diversities in Use. *Research Journal of Finance and Accounting*, 5(19), 1-15.
32. Wang, G., Gunasekaran, A., Ngai, E. W., & Papadopoulos, T. (2016). Big data analytics in logistics and supply chain management: Certain investigations for research and applications. *International Journal of Production Economics*, 176, 98-110.
33. Xiao, Q., Savage, G. T., & Zhuang, W. (2014). The influence of environmental and organizational factors on hospitals' clinical IT sophistication. *Journal of Health and Human Services Administration*, 33(2), 158-192.