

Adoption of Information Technology on Small Businesses: The Role of Environment, Organizational and Leader Determinant

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Abstract

Leader, organizational and environment determinants for small businesses have important roles in making decision to adopt information technology (IT). The purpose of this research is examine effects of leader determinants (leader innovativeness and level of leader IT knowledge), organizational determinants (business size, level of employees' knowledge IT, information intensity) and environment factor to decision to adopt information technology. A survey was conducted in Yogyakarta city by purposive sampling technique. The samples that are 102 small business. Partial Least Squares method was used to examine five research hypotheses. Research instrument validity was measured by convergent validity and discriminant validity. Instrument reliability was measured by cronbach's alpha and composite reliability. This research shows that leader' IT knowledge, firm size, and information intensity have significantly positive effect on the decision of small businesses to adopt IT. On the other hand leader innovativeness, employees' IT knowledge and competitive have no effect to small businesses decision to adopt IT.

Keywords: small business, information technology, organizational, environment, leader.

1. Background

Information technology (IT) provides an opportunity for businesses to improve their efficiency and effectiveness, and even to gain competitive advantage. For a small business, embarking on IT adoption for the first time is non-trivial as there is a lot of uncertainty and risk involved. The introduction of IT is likely to cause changes in work procedures and increase computer anxiety among the employees. The technological innovation literature has identified many variables that are possible determinants of organizational adoption of an innovation. The introduction of IT is likely to cause changes in work procedures and increase computer anxiety among the employees. The technological innovation literature has identified many variables that are possible determinants of organizational adoption of an innovation. Most of these studies have investigated the effect of organizational characteristics on adoption of innovations. Organizational characteristics that have been studied include size and IT'employee knowledge.

Besides organizational characteristics, the importance of leader has also been investigated. In particular, researchers have focused on the characteristics of the owner. The rationale is that the leader/owner plays a major role in a business. He is the main decision maker and shapes the future of the business. The ability of the entrepreneurial 'mould maker' to break free from the chains of bureaucracy, fan the flames of innovation, and create new situations has been the basis of the growth of many of today's great corporations. The impact of the leader is even stronger in small businesses. Although a small business may not influence the industry as tremendously as its larger counterparts, its leader plays just as major a role in the survival of the business. This is because in a small business, the leader, who is usually also the owner of the business, tends to have more personal contact with other key managers and have to do more work by himself [48].

Leader, organizational and environmental determinants of small businesses have important roles in information technology (IT) adoption. Most of these studies have investigated the effects of leader, organizational and environment characteristics on adoption of innovations in large businesses context, but in small businesses context still little, especially in Yogyakarta city. The purpose of this study is to examine the effect of leader's determinants (leader's innovativeness and level of leader's IT knowledge), organizational characteristics (business size, level of employees' knowledge IT, information intensity) and environmental determinants on the decision to adopt IT.

2. Research Model and Hypotheses

Based on a review of the literature on technological innovation, a research model was developed (see Fig. 1). As this is an early study and the objective is to identify primary relationships, we decided to use a one-stage model relating independent and dependent variables, without any intermediate variables. As more experience is gained, the model can be refined.

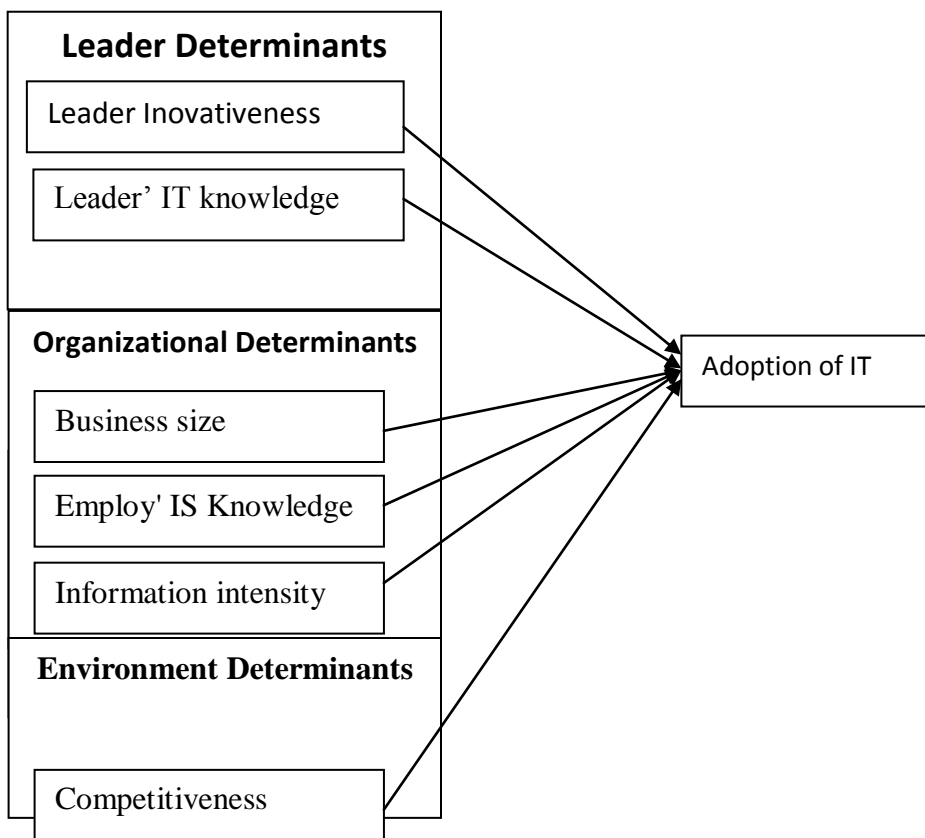


Figure 1. Research Model

2.1 Adoption of IT

The dependent variable is adoption of IT. In this study, adoption of IT is defined as using computer hardware and software applications to support operations, management, and decision making in the business (Davish & Olson, 1985). This implies that IT is used productively and is not a 'white elephant'. The primary purpose is to identify the important determinants that lead to adoption of IT.

2.2 Leader Determinants

2.2.1 Leader innovativeness

The leader is an entrepreneur figure who is crucial in determining the innovative attitude of a small business (Rizzoni, 1991). This is because the leader's qualities are the determinants of the overall management style of the business (Rothwell, 1977).

In fact, the rate at which a small business changes depends not only on determinants like business size or market forces, but also on the abilities and inclinations of the leader and the extent to which he is able or prepared to devolve management (Birley, 1982). It is the role adopted by the leader that determines the innovativeness of the business (Connon, 1985). Kirton (1976) contended that everyone is located on a continuum ranging from an ability to do things better to an ability to do things differently. He called the two extreme ends of the continuum adaptors and innovators respectively. In a business, the adaptor leader would seek solutions that have already been tried and understood. On the other hand, the innovator leader would prefer solutions that change the structure in which the problem is embedded—in other words, solutions that have not been tried out and are therefore risky (Kirton, 1984). Unless the leader has the will to innovate, there is little that other members of the business can do to expedite the adoption of IT.

Hypothesis 1: Businesses with more innovative leaders are more likely to adopt IT.

2.2.2 Leader' IT knowledge.

Typically, small businesses are lacking in specialized IT knowledge and technical skills (Gable, 1991). Niedleman (1979) attributed the failure of European small businesses to utilize IT to lack of IT knowledge. In a study of Singapore small businesses, Gable and Raman (1992) found that leaders in such businesses tend to lack basic knowledge and awareness of IT. Many of them rejected the notion that IT could be of any use to their business as they had no idea of the benefits that IT could potentially offer. This would seem to imply that if these leaders could be educated on the benefits of IT, they may be more willing to adopt such technology.

Hypothesis 2: Businesses with leaders who are more knowledgeable about IT are more likely to adopt IT.

2.3 Organizational Determinants

2.3.1 Business size

Small businesses suffer from a special condition commonly referred to as resource poverty. Resource poverty results from various conditions unique to small businesses, such as operating in a highly competitive environment, financial constraints, lack of professional expertise, and susceptibility to external forces. Because of these unique conditions, small businesses are characterized by severe constraints on financial resources, a lack of in-house IT expertise, and a short-range management perspective (Welsh & White, 1981). Consequently, small businesses face substantially more barriers to adoption of IT and are less likely to adopt IT than large businesses (Ein-Dor & Segev, 1978). Alpar and Reeves (1990) argued that even amongst small businesses, the larger the business, the more able it is to hire people with specialized skills, such as knowledge of IT. In addition, it would appear reasonable to suppose that larger businesses have more potential to use IT than small businesses, simply because of their larger scale of operations (Lind et al, 1989).

Hypothesis 3: Businesses that are larger in size are more likely to adopt IT.

2.3.2 Employees' IS Knowledge

Similarly, Attewell's (1992) technological innovation theory has implications for employees of small businesses. Typically, small businesses are lacking in specialized IS knowledge and technical skills (Gagle, 1991). Neidleman (1979) attributes the failure of European small businesses to utilize IS to lack of IS knowledge. Because of obstacles with developing the necessary skills and technical knowledge, many businesses are tempted to postpone adoption of the innovation until they have sufficient internal expertise. Hence, if employees of small businesses are knowledgeable about IS, the businesses may be more willing to adopt IS and adopt more IS. Further, there is empirical evidence that businesses with employees who have more knowledge of the technological innovation are likely to use more of the innovation (Ettlie, 1990).

Hypothesis 4: Businesses with employees who are more knowledgeable about IT are more likely to adopt IT.

3.3.3 Information intensity

The degree to which information is present in the product or service of a business reflects the level of information intensity of that product or service. Businesses in different sectors have different information processing needs and those in more information-intensive sectors are more likely to adopt IT than those in less information-intensive sectors (Yap, 1989).

For instance, travel agencies are more information intensive, as their main functions are to process and package tour information. Further, the greater the information intensity, the greater the potential for strategic uses of IT in a business (Porter & Millar, 1985).

Hypothesis 5: Businesses that are in more information-intensive environments are more likely to adopt IT.

2.4 Environment Determinants

2.4.1 Competitiveness of environment

By competitiveness of the business environment, we mean the competition faced by the business in its particular industry. It is tough rivalry that pushes businesses to be innovative (Porter, 1990). Porter and Millar (1985) saw businesses as having to cope with five competitive forces, namely new entrants, the threat of substitute products or services, bargaining power of customers, bargaining power of suppliers, and rivalry amongst current competitors. They suggested that by adopting IT, businesses will be able to change their environment in three ways, IT can change the industry structure and, in so doing, alter the rules of competition. IT can also create competitive advantage by giving businesses new ways to outperform their rivals. Finally, IT spawns new businesses, often from within existing operations of the business. Therefore, a business in an environment that is more competitive would feel a greater need to turn to IT to gain competitive advantage. On the other hand, a business in a less competitive environment would not be faced with a push to be innovative. Economists generally believe that competition increases the likelihood of adoption of innovation (Kimberly & Evanisko, 1981) and market power is generally believed to have a positive influence on innovation (Link & Bozeman, 1991).

Hypothesis 6: Businesses that are more competitive environments are more likely to adopt IT.

3. Method

A survey was conducted in Yogyakarta city by purposive sampling technique. This study was conducted in two phases: a pilot study and a questionnaire survey. The pilot study phase aim to determine whether there were any problems with the questionnaire. In the questionnaire survey, a package was directed given to the leader of each of the small businesses in the survey sample. one hundred and twenty small businesses returned the questionnaires. However, 18 questionnaires were returned uncompleted. This resulted in 102 usable questionnaires for data analysis. Partial Least Squares was used to analyze data .

In PLS analysis, the reliability of a variable is evaluated by computing composite reliability (table 1) while convergent validity is evaluated by the average variance extracted (AVE) (Table 2). Acceptable values for composite reliability and average variance extracted are 0.7 and 0.5, respectively (Chan et al., 1997). From table 1, all the variables were reliable and met the condition for convergent validity. Discriminant validity of the variables was evaluated by comparing the average variance extracted for the variable with the squared correlations between it and the other variables. In all cases, the average variance extracted was greater than the squared correlations between variables, indicating that all the variables in the model exhibited discriminant validity (table 3).

Table 1. Composite Reliability

Variable	Composite Reliability
Information Intensity	0,966772
Leader Innovativeness	0,966150
Competitiveness	0,857121
Employees' IT knowledge	0,960703
Leader's IT knowledge	0,938581
Adoption	1,000000
Firm Size	1,000000

Table 2. Average Variance Extracted

Variable	AVE	Squared AVE
Information Intensity	0,906539	0,952123
Leader Innovativeness	0,877112	0,936547
Competitiveness	0,668819	0,817813
Employees' IT knowledge	0,859581	0,927135
Leader's IT knowledge	0,792869	0,890431
Adoption	1,000000	1,000000
Firm Size	1,000000	1,000000

Table 3. Latent variable correlation score

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Information Intensity	0,952123						
(2) Leader Innovativeness	0.902969	0,936547					
(3) Competitiveness	0.648857	0.689840	0,817813				
(4) Employees' IT knowledge	0.863236	0.862002	0.637856	0,927135			
(5) Leader's IT knowledge	0.881012	0.894321	0.705239	0.896320	0,890431		
(6) Adoption	0.929546	0.925402	0.710250	0.918794	0.943752	1	
(7) Firm Size	0.648261	0.633309	0.529130	0.682779	0.655286	0.700153	1

4. Hypotheses Testing

The research data were analyzed using partial least squares (PLS). The result shown in table 4. The results provide support for three of the hypotheses: H2, H3, and H5. The other hand, H1, H4 and H6 not supported. They suggest that businesses that have leaders who are more knowledgeable about IT and more information-intensive environments are more likely to adopt IT. In addition, businesses that have more employees tend to adopt IT. There is no significant difference between adopters and non-adopters of IT in terms of innovativeness of leader, employees' IT knowledge and competitiveness of environment.

Table 4. Hypotheses Testing

Variable	t value	Significance	
Information Intensity -> IT adoption	2,048	0,022*	Supported
Leader Innovativeness -> IT adoption	0,743	0,229	Not supported
Competitive -> IT adoption	0,897	0,187	Not Supported
Employees' IT knowledge -> IT adoption	1,059	0,146	Not Supported
Leader's IT knowledge -> IT adoption	1,999	0,025*	Supported
Firm size -> adoption	1,652	0,051**	Supported (marginal)

*<0,05 **0,1

5. Discussion

This study has examined potential determinants of IT adoption in small businesses. The main finding is that in addition to leader IT knowledge, business size, Information intensity are significant determinants of the decision to adopt IT in small businesses. Businesses that are bigger in size are more likely to adopt IT. As small businesses are characterized by severe constraints on resources such as finance and in-house technical expertise, adoption of IT represents a disproportionately large financial risk (Welsh & White, 1981). Only businesses that have adequate financial and organizational resources would consider adoption of IT a viable project to undertake. Hence, having adequate resources is a necessary first-step towards the decision to adopt IT. This is in agreement with findings from other studies in the technological innovation literature (Lin & Bozeman, 1991). The main finding of this study is that besides business size, leader IT knowledge are important determinants of the decision to adopt IT. Small businesses with leaders who have more knowledge about IT are more likely to adopt IT.

The leader must be aware of the ability of the IT innovation and how to use it properly. With greater knowledge, the degree of uncertainty involved in IT adoption will diminish, resulting in a less risky adoption of IT. This is consistent with the findings of other studies which reported that the lack of knowledge of the IT adoption process and insufficient awareness of the potential benefits may be inhibiting businesses from adopting IT (Sen & Gibson, 1981). To the extent a leader can lower the knowledge inadequacies, it will facilitate the path to adoption of IT. This finding is also supported by evidence from the technological innovation literature. For example, Dewar and Dutton (1986) found that extensive knowledge is important for the adoption of technical process innovations.

The third organizational characteristic that affects the extent of IS adoption is information intensity. The greater the information intensity of the product or service that the small business is involved in, the greater the extent of IS adoption. This provides some support for the information-processing theory. Galbraith (Ibrahim & Goodwin, 1989) found that, when businesses take on uncertain tasks, such as scanning and processing complex information about new innovations, they have to manage the increase in information load with various design strategies. Similarly, a small business dealing with a product or service with high information intensity can make more extensive use of IS to meet its information-processing needs.

Contrary to our hypotheses, competitiveness of the environment do not have any significant direct effects on the decision of small businesses to adopt IT. This suggests that businesses that adopt IT do not do so because of their environment, since both adopters and non-adopters are actually operating in similar environments. Therefore, the competitiveness of environment does not really provide any direct 'push' for businesses to adopt IT.

6. Conclusion

Using theories from the technological innovation literature, this study developed and tested IT adoption in small businesses. This study has examined the effects of leaders, environmental and organizational determinants on the decision of small businesses to adopt IT. It concludes that IT knowledgeable leader, business size and information intensity are important determinants of the decision to adopt IT. The implications of this study are, first, the study highlights the importance of having IT knowledgeable leaders. A small business managed by a leaders who understands the benefits of IT adoption will be able to take advantage of the promised benefits of IT adoption, including improved organizational efficiency and effectiveness. Second, among the IT adopters, those small businesses that have greater information-processing needs will tend to adopt more IT. This greater need for information processing will have to be supplemented by IT infrastructure.

7. Limitation and Implication

Finally, two limitations of this study are discussed. First, due to the cross-sectional nature of the study, direction of causality can only be inferred. It was not possible to measure directly the perception of the leader at the time of adoption of IT. This is ameliorated to some extent by requesting the respondent to ascertain his or her perceptions before IT adoption. However, we cannot be completely certain that the respondent can back-track his or her mind uninfluenced by the experience of IT adoption to what the state was before adoption of IT. Longitudinal studies will have to be conducted to determine the causality links more explicitly.

Second, this study has investigated a subset of the individual, organizational and environment characteristics. There may be other characteristics of the leader and other organizational characteristics which may be potential determinants of IT adoption by small businesses. Future research should examine this possibility. Notwithstanding these limitations, we believe that this study has identified important determinants of IT adoption in small businesses. The findings of this study are also applicable to small businesses in other countries because small businesses everywhere suffer from similar resources constraints due to their size.

These findings have implications for IT consultants, vendors, and government agencies responsible for promoting IT adoption. To increase their chances of success, IT consultants and vendors are advised to target their marketing at businesses with innovative leaders. They ought to look out for indicators of innovative behaviors such as adoption of new production technology or processes, imaginative advertisements, and participation in trade organizations and exhibitions.

For those leaders who are less innovative and thus highly adaptive, consultants and vendors should take steps to create IT awareness among these leaders so as to educate them. Adaptive leaders prefer not to adopt IT unless they are sure that adoption of IT is one way of doing things better and not doing things differently.

With a better understanding of IT and its potential benefits, these leaders may develop more positive attitudes towards adoption of IT. As their attitudes become more positive, they will be more receptive towards the idea of adopting IT. Government agencies responsible for promoting IT adoption should focus their effort on raising IT literacy. This can be achieved through subsidized IT seminars and training programs specially designed for leaders and employees of small businesses.

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