

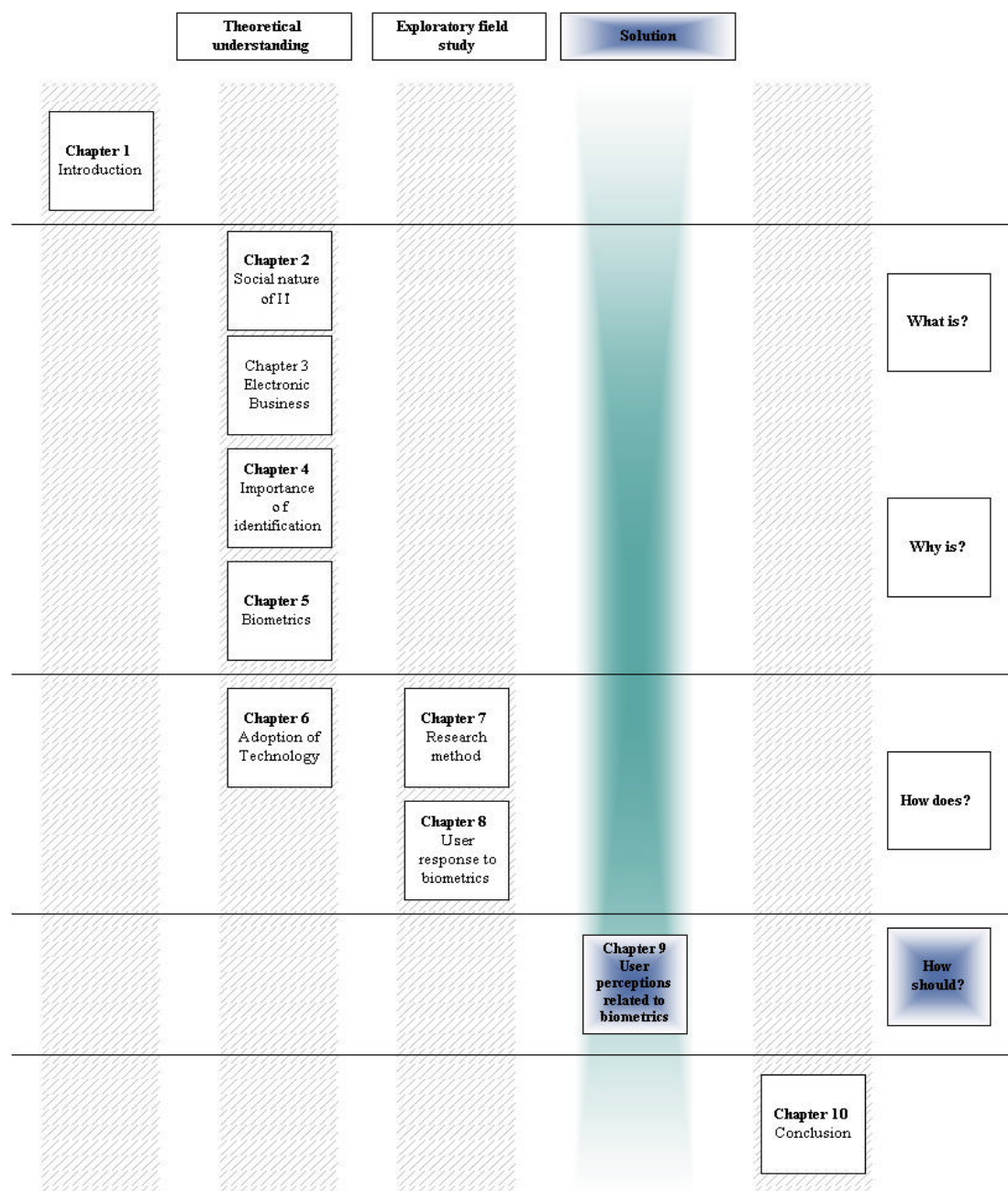
CHAPTER 9: User perceptions related to biometrics

9. CHAPTER 9: USER PERCEPTIONS RELATED TO BIOMETRICS

“Wisdom denotes pursuing the best end by the best means.”

Francis Hutcheson

Figure 9-1: Thesis roadmap – Chapter 9



CHAPTER 9: User perceptions related to biometrics

9.1 Introduction

This chapter provides an exploratory field study of “User perceptions related to biometrics”, addressing the research question: “How user perceptions, related to biometrics, should be taken into consideration to ensure success with the implementation of identification through biometrics in Electronic Business?” This chapter has the following sections:

- ❑ Discussing user perceptions related to biometrics that need to be considered for biometric identification systems.
- ❑ Revisiting the Technology Adoption Model constructed in Chapter 6 – Adoption of Technology.
- ❑ Listing additional use of biometrics as identified by the employees that participated in the research study questionnaire.
- ❑ Summarizing additional comments by employees on the research study problem statement presented to them.
- ❑ Illustrating the interest shown by the employees that answered the questionnaire in receiving the research study results.
- ❑ Summarizing the results of the focus group with key employees that responded to the research study questionnaire by discussing the conclusions reached within Chapter 8 and 9 of the research study in order to provide more insight into the employee’s perceptions and attitudes before moving on to the chapter’s conclusion.

The answers and/or perceptions relating to the research questions will be reported on by summarizing the findings in tables and schematic diagrams.

9.2 User perceptions

“The adoption of emerging technologies always takes longer than the Information Technology (IT) industry would like it to.”

Phil Duff

CHAPTER 9: User perceptions related to biometrics

The research study questionnaire tried to obtain **two** views on how the implementation of identification through biometrics in Electronic Business should be handled to ensure success: one from a user perspective and one from a developer/implementation perspective. This was done to establish if the Technology Adoption Model as identified in Chapter 6 – Adoption of Technology was correctly compiled.

9.2.1 User perspective

The employees were asked (Question 45): “In your opinion, as an individual (user of the biometric identification system), how should the implementation of identification through biometrics in Electronic Business be handled to ensure success?” The employees’ responses are listed from the most to the least mentioned answers to indicate the strengths of the themes:

- ❑ Pilot project – a pilot site for testing purposes should be constructed to enable users can gain confidence in the process, testing through a pilot site is extremely important, the users should be provided with the results of the testing to ensure them that it is secure and the pilot projects should be managed by well established organizations.
- ❑ Information – the general public should be informed, users need to be well educated on how it will be implemented, how it will be used and how it works and users need to be provided with a detailed user guide.
- ❑ Joint effort – the entire Electronic Business should work together to achieve this and a single stringent standard, starting with the national ID incorporating various accepted encrypted biometrics would ensure mass availability for deployment.
- ❑ Ease of use – ergonomics is the key, easy installation and operating the system with minimum maintenance.
- ❑ Legislation – Government and financial institutions should enforce the adoption of biometrics and a legal admissible identification and authentication standard would lay down all the groundwork required for credibility.

CHAPTER 9: User perceptions related to biometrics

- ❑ Costs – a biometric identification system should be available to all and the cost of implementing such a means of identification needs to be acceptable to a large number of prospective users.
- ❑ Trust – face-to-face registration at central trusted point.
- ❑ Security – it must prove itself to be tamper-proof.
- ❑ General service – a biometric identification system should be implemented as a service to the general public.
- ❑ Speed – should be fast with verification.
- ❑ Phased approach – should be implemented progressively and not replace redundant systems outright.
- ❑ Freedom of choice – more than one means of biometric identification needs to be offered by a business to ensure that those who are not comfortable with a certain identification method or way are accommodated.
- ❑ One employee commented that it should not be implemented before the speed of the verification process has been improved.

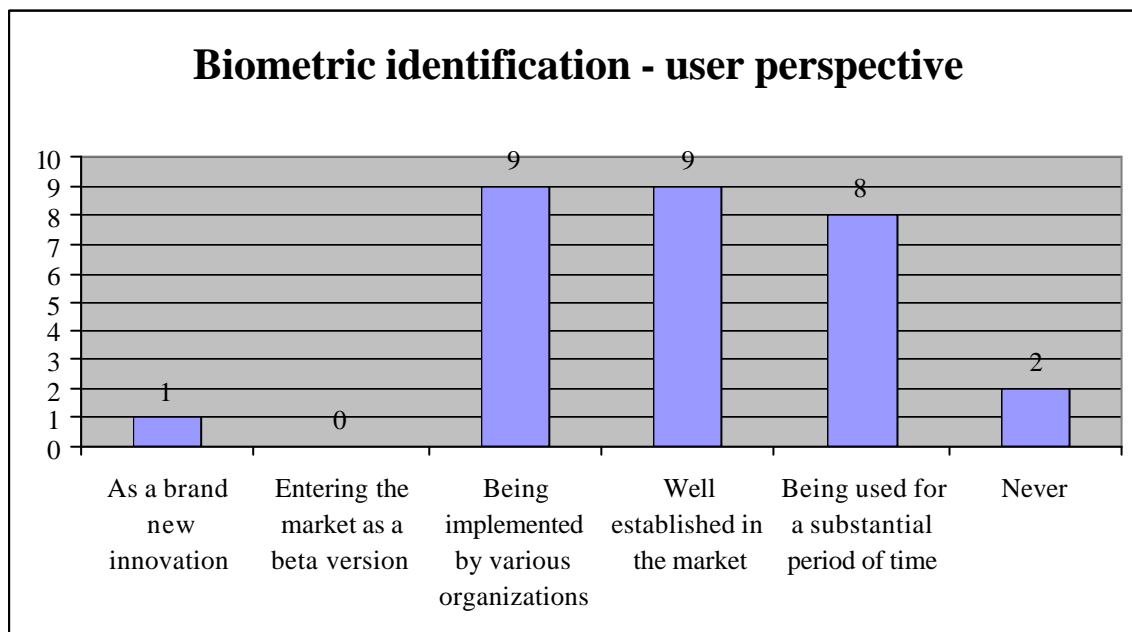
The employees were asked (Question 44): “When will you, as an individual, adopt biometrics as an identification system?” and the following table and figure summarize their responses:

CHAPTER 9: User perceptions related to biometrics

Table 9-1: Biometric identification – user perspective

Themes	Selected	Rank
Question 44: When will you, as an individual, adopt biometrics as an identification system?		
As a brand new innovation	1	4
Entering the market as a beta version	0	5
Being implemented by various organizations	9	1
Well established in the market	9	1
Being used for a substantial period of time	8	2
Never	2	3

Figure 9-2: Biometric identification – user perspective



9.2.2 Developer/implementation perspective

When the employees were asked (Question 49): “In your opinion, from a developer/implementation perspective, how should the implementation of identification through biometrics in Electronic Business be handled to ensure

CHAPTER 9: User perceptions related to biometrics

success?” The employees’ responses are listed from the most to the least mentioned answers to indicate the strengths of the themes:

- ❑ Ease of use – it should be implemented as a quick and hassle free identification system, it should be easy to install and to maintain, and it should be configurable for future expansion and for easy change of user details.
- ❑ Marketing – awareness campaigns should be launched, benefits should be marketed to the Internet and the marketplace should be educated.
- ❑ Pilot sites – pilot and demo sites should be constructed and an innovative organization should be used to test the biometric identification system on a specific target market.
- ❑ Training – training should be offered by means of study groups and user guides.
- ❑ Legislation – it should be implemented as a single sanctioned standard developed by reputable partners.
- ❑ Costs – a biometric identification system should be available to all and the cost of implementing such a means of identification needs to be acceptable to a large number of prospective users.
- ❑ Trust – face-to-face registration at central trusted point.
- ❑ General service – a biometric identification system should be implemented as a service to the general public.
- ❑ Phased approach – be implemented progressively and not replacing redundant systems outright.
- ❑ Hardware – packaged as part of PC hardware not issued by an organization.
- ❑ One employee commented that it should not be implemented before the speed of the verification process has not been improved.

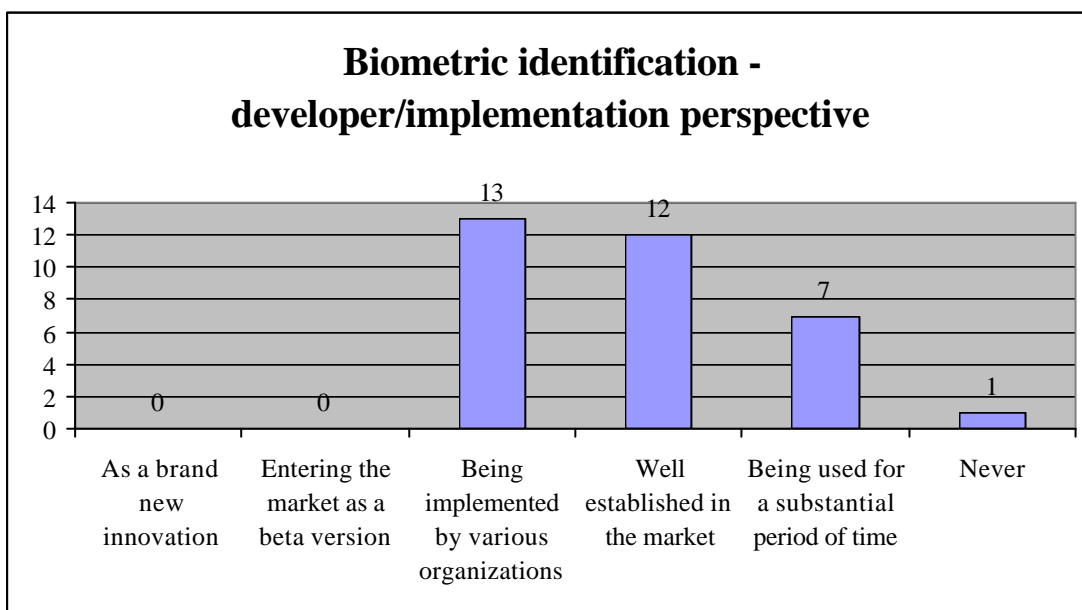
The employees were asked (Question 48): “When, in your opinion, will an organization adopt biometrics as an identification system?” and the following table and figure summarize their responses:

CHAPTER 9: User perceptions related to biometrics

Table 9-2: Biometric identification – developer/implementation perspective

Themes	Selected	Rank
Question 48: When, in your opinion, will an organization adopt biometrics as an identification system?		
As a brand new innovation	0	5
Entering the market as a beta version	0	5
Being implemented by various organizations	13	1
Well established in the market	12	2
Being used for a substantial period of time	7	3
Never	1	4

Figure 9-3: Biometric identification – developer/implementation perspective



CHAPTER 9: User perceptions related to biometrics

9.3 Technology Adoption Model – revised

This section revisits the Technology Adoption Model developed based on the results of the questionnaire conducted to establish if any changes should be made to the Technology Adoption Model reported on in Chapter 6 – Adoption of Technology.

9.3.1 User perceptions

The user perceptions section of the Technology Adoption Model is based on Davis's (1989) technology acceptance model (TAM). The results of the research study questionnaire show that the employees indicated that perceived usefulness (PU) and perceived ease of use (PEOU) would definitely play a role in their adoption of biometrics as an identification system. Their comments are listed from the most to the least mentioned answers to indicate the strengths of the themes:

- ❑ Ease of use of e-transacting on the Internet and within Electronic Business is important.
- ❑ The employees perceive biometrics as a possible means of identification as being a more workable solution than traditional methods, because it is easier to use (a password and/or PIN need not be remembered) and it provides a single log-in to multiple systems.
- ❑ The employees are willing to make use of any biometric identification method as long as it is easy to use.
- ❑ Ease of use factors could probably prevent employees and/or organizations from adopting biometrics as an identification system, as it could be too complicated and difficult to use.
- ❑ On the other hand, ease of use factors could probably motivate employees and/or organizations to adopt biometrics as an identification system based on the simplicity of the biometric identification system.
- ❑ Ergonomics is the key – easy installation and operating the system with minimum maintenance.

CHAPTER 9: User perceptions related to biometrics

- ❑ The implementation of a biometric identification system should be quick and hassle free, easy to install and to maintain.
- ❑ The biometric identification system should be configurable for future expansion.
- ❑ The biometric identification system should be configurable for easy change of user details.

The employees indicated a need for information on biometrics as an identification method. They suggested that the implementation should be handled via pilot projects and as a phased approach, indicating that product trial and repetitive usage play an important role for them in making sense of the technology. They mentioned that new technology would lead to new, different type of problems, meaning that they would only be able to reflect accurately on the new innovation once it has been used for a period of time; in other words, retrospectively. All these factors would eventually lead to an adoption or rejection decision by the individual evaluating the innovation.

In other words, “user perceptions” related to biometrics play a vital role in the adoption of technology and should form part of the Technology Adoption Model developed for the research study. Further, based on the results of the research study questionnaire, it was necessary for a new sub-section to be added to the Technology Adoption Model developed for the research study, namely “social factors”.

9.3.2 Social factors

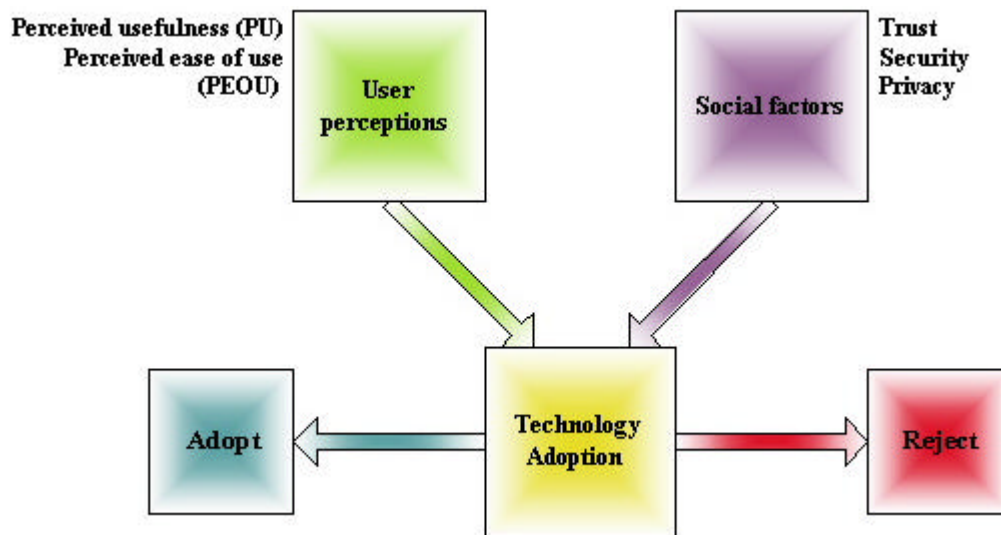
The results of the questionnaire indicate that the employees’ social factor concerns include e-transacting security and/or fraud, information privacy, and trust amongst participants within Electronic Business. The employees are concerned about the impact of biometric identification, but realize that it can provide them with additional security and better privacy protection, and that it would help build trust amongst participants. They conclude by stating that biometric identification would make them feel safer with regard to information

CHAPTER 9: User perceptions related to biometrics

privacy and e-transacting security, therefore making them as a trusting user of Electronic Business. This statement alone shows how important it is to control social factor influences, and the fact that social factors are interlinked and should be addressed carefully, as one social factor will have an impact on the other.

In other words, “social factors” have a definite impact on user perceptions related to biometrics and should be added to the original Technology Adoption Model as compiled in Chapter 6 – Adoption of Technology. The following figure illustrates the revised Technology Adoption Model as defined for the research study problem statement:

Figure 9-4: Technology Adoption Model – revised



9.4 Biometric identification – additional use

As part of the research study questionnaire the employees were asked (Question 50): “Where else would biometric identification be of use outside Electronic Business?” The employees’ responses are listed from the most to the least mentioned answers to indicate the strengths of the themes:

- At retail outlets (goods suppliers and manufacturers).
- At buildings, warehouses, airports.

CHAPTER 9: User perceptions related to biometrics

- ❑ Police services for crime detection and prison visitor systems, where visitors to inmates are subject to verification procedures in order that identities may not be swapped during the visit.
- ❑ Public services (health institutions, internal affairs).
- ❑ Schools and other educational institutes.
- ❑ As access control and time-and-attendance systems.
- ❑ As verification on electronic cheques.
- ❑ ATMs.
- ❑ As part of credit card information to include with your signature.
- ❑ Vehicle and home security systems.
- ❑ UIF claims, pension payments and administration.
- ❑ In place of an ID book at voting stations during elections.
- ❑ Any environment that requires positive authenticated identification has a use for biometrics, hence the preference for a universal standard like a mobile biometric on a national ID.

9.5 Research study questionnaire – additional comments

Additional comments received from the employees that participated in the research study questionnaire include the following statements (Question 51). The employees' responses are listed from the most to the least mentioned answers to indicate the strengths of the themes:

- ❑ Innovations will only be adopted if enough economical benefits can be gained.
- ❑ User convenience (ease of use) will play a role if the perceived benefits surpass the costs.
- ❑ The technology is too expensive.
- ❑ Users should be informed, as they think it only exists in movies.
- ❑ Biometrics is a must for the future.
- ❑ Must be done in partnership with the government.
- ❑ Regulate standards and procedures (legislation).
- ❑ When can we implement it?

CHAPTER 9: User perceptions related to biometrics

- ❑ Should be used for identification and something else - added value e.g. are people inside or outside a building?
- ❑ It is probably an inevitability in the marketplace, but feel that it will be driven by the big corporations like Microsoft, IBM, etc. as a different avenue for revenues, not from any real world requirement.
- ❑ All the solutions are currently in existence - the problem for adoption has been lack of universal standards, and credibility from influential third parties like government, despite their limited use of the technology already.
- ❑ The method of identification being used will have to be considered with regard to the possibility of one or both hands being injured and fingerprints not being available. The same will apply to all the other methods or biometric identification. Another reason for more than one method of identification to be available.

To conclude, most of the employees have a positive attitude towards biometrics as an identification system if the correct procedures are followed, relevant information is made available, additional benefits are visible and it is easy to use.

9.6 Research result interests

The employees were asked whether they would be interested in receiving the questionnaire results and the majority (twenty employees) stated that they would, implying that there is a growing interest in biometrics as a means of identification within Electronic Business. The results is summarized in the following table and figure:

Table 9-3: Research result interests

Themes	Selected	Rank
Question 52: Would you be interested in receiving a copy of the thesis results?		
Yes	20	1
No	6	2

9.7 Focus group results

“In a changing world we must be prepared to change with it.”

Benjamin Franklin

Lastly, as part of the exploratory field study section of the research study, a focus group discussion was held with key employees to discuss the conclusions reached in Chapter 8 and 9. This was done to obtain additional insight into the employees' perceptions of and attitudes towards the research study problem statement presented to them in the questionnaire. The comments of the employees that participated in the research study focus group are listed from the most to the least mentioned answers to indicate the strengths of the themes:

1. They again stressed the need for more information on biometric identification methods:
 - ❑ What will biometric identification methods improve within Electronic Business?
 - ❑ What additional value can be obtained from using a biometric identification method within Electronic Business?
 - ❑ Can we trust biometric identification methods?
2. They suggested that a better understanding should be reached on why certain identification methods are perceived to be more acceptable to users than others. This is necessary to understand how user perceptions related to biometrics should be addressed to ensure success with the implementation of identification through biometrics in Electronic Business. For example, individuals no longer carry cash, but prefer to pay with a credit card, although such transactions could also lead to fraudulent transactions. Is the one method perceived to be more or less secure than the other? For example is a user-id, pin and password method perceived to be more or less secure than a biometric identification method?

CHAPTER 9: User perceptions related to biometrics

3. The employees indicated that certain motivational factors would play an important role in user perceptions related to biometrics. For example, ease of use would probably motivate individuals to start using a new innovation even though they are still not entirely comfortable with it, as indicated in the “user perceptions” portion of the Technology Adoption Model compiled for the research study.
4. They discussed the impact that different generations would have on user perceptions relating to biometric identification methods within Electronic Business.
5. Lastly, they mentioned that our current lifestyle would force individuals to adopt new innovations e.g. an individual does not have the time to walk from shop to shop to find the best buy, and so would go on to the Internet for on-line shopping, even though they still think that using their credit card number carries certain risks. Over time the first-glance risks seem to fade and disappear until something happens that again alerts everyone to the already known risks.

9.8 Conclusion

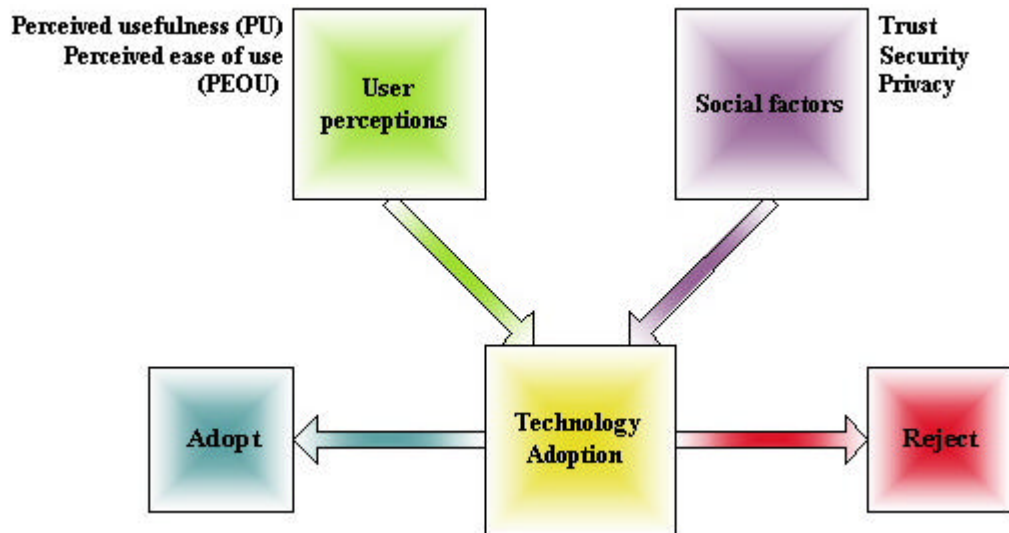
It was concluded in this chapter, **Chapter 9 – User perceptions related to biometrics**, that there is seemingly still uncertainty regarding the implementation of biometrics as an identification system amongst individuals and organizations. The need was expressed for reassurance through phased approach pilot projects, joint efforts between participants within Electronic Business and the provision of additional information to the general public. Individuals and organizations are only interested in using biometrics as an identification system if it has already been implemented by various organizations i.e. it is well established in the market and if it has been used for a substantial period of time.

From the results of the research study, it was concluded that the Technology Adoption Model developed for the research study would be of use in

CHAPTER 9: User perceptions related to biometrics

addressing user perceptions related to biometrics by adding a social factor section to the model initially developed.

Figure 9-5: Technology Adoption Model – revised



The employees are definitely seeing the possibilities of biometrics and have suggested interesting uses for biometrics that include ATMs, vehicle and home security systems, UIF claims, access control and time-and-attendance systems, schools, etc. This would seem to imply that they are willing to make use of biometrics almost anywhere, anyplace. Furthermore, most of the employees have a positive attitude towards biometrics as an identification system if the correct procedures are followed, relevant information is made available, additional benefits can be seen from the biometric identification system, and it is easy to use. The employees were asked if they would be interested in receiving the questionnaire results and the majority, twenty employees out of the twenty-six that conducted the questionnaire, were interested in receiving the research study results, implying that there is a growing interest in biometrics as a means of identification within Electronic Business.

Lastly, results from a focus group held with key employees to discuss the conclusions reached in Chapter 8 and 9 of the research study in order to

CHAPTER 9: User perceptions related to biometrics

provide more insight in to the employees' perceptions and attitudes were provided.

This chapter has therefore, addressed the research question: “How user perceptions, related to biometrics, should be taken into consideration to ensure success with the implementation of identification through biometrics in Electronic Business?”