2   LITERATURE REVIEW

2.1   E-Commerce Defined

A study on online payment would not be complete without the discussion on electronic commerce as it is electronic commerce which triggers the need for an online payment system. Electronic commerce can be defined as *the sharing of business information, maintaining business relationship and conducting business transactions by means of telecommunications networks*. Electronic commerce can be categorized into three meta levels ; infrastructure, services, and product and structures (Zwass, 1996).

Many authors seem to concur on this definition of electronic commerce, especially on the use of telecommunications and computer networks, although limiting the scope to only to the conduct of commerce in goods and services (Clarke) and buying and selling of information, products and services (Kalakota & Whinston, 1996). Some even extend the use of telecommunications in e-commerce to include support for any kind of business transactions over a digital infrastructure (Bloch, Pigneur, Seger, 1996).

2.2   Online Payment Systems

There seems to be a disagreement on how many types of online payment that exist today. Some say there are only three types of online payment system which is credit card based system, electronic cash based system, and smart card based system (Berst, 1998). Others argued that there are four types of online payment systems that are implemented in the business world today. The systems are credit-

card based system, electronic checks based system, electronic cash based system, and micro payment based system (O'Mahony, Peirce, Tewari, 1997). However, those methods are not the sole methods to accept payment online. Online payment can also be implemented by using Automatic Teller Machines (ATM) cards, debit cards, purchasing cards which are issued by corporations to their employees, and eCHARGE where purchases are charged to customers normal telephone bills (Ecominfocenter).

Credit card based system can be categorized as mediated three party transactions (Payment Methods) although there are actually five parties that are involved, namely the consumer, the issuing bank, the merchant, the acquiring bank, and the acquiring processor (Evans, 1999).The Internet credit card payment processes begin with the purchase, followed by the authorization, fraud prevention, authorization & confirmation, and end with the capture, settlement, and administration (Klemow, 1999). In an electronic checks based system, the consumer gives instruction to the payee's bank to make a payment of a specified amount to an identified payee. Electronic cash is basically a digital replication of cash in real life while micro payment based system is for low value per-transaction and had started only recently in 1995. (O'Mahony et. al.)

All the online payment methods have its advantages and disadvantages. Whatever method is chosen, it must fulfill certain requirements while keeping in view the constraints of the method. The commercial requirements are flexibility, ease of use, and cost effectiveness while the security requirements are safety, privacy, and trustworthiness. The constraints of the method are integration, acceptability, portability, and exclusivity (Buck, 1997).

On one hand, credit cards could be the best alternative, due to its ability to adapt easily to the Internet's global nature and the need to provide a cost-effective way for exchanging funds into local currencies no matter where the sale originates (Taneja, 1999). Furthermore, technology to provide for a secure credit card payment over the Internet is already in existence with the Secure Socket Layer (SSL) and Secure Electronic Transaction (SET). SSL provides a secure connection between two machines. Payment systems are constructed by transmitting credit-card numbers over an SSL connection. SET is a messaging protocol designed specifically by MasterCard, Visa, and other industry players to secure bank-card payment transactions over open networks. However, it seems that SET has more benefits to offer to businesses than SSL (Abbot, 1999). It's cost is lower, it provides strong encryption and authentication, it has a shorter waiting period, and it is backed by two world known companies which are MasterCard and Visa (Lamond).

On the other hand, electronic cash appeals to a lot more people due to certain factors : acceptability, guaranteed payment, no transaction charge, and anonymity, although the last factor could also mean that electronic cash can be used by criminals for illegal purposes (O'Mahony et. al.). Latest news of electronic cash in the form of electronic wallet could be THE answer to online payment. Introduced by Qpass and eHNC, the system enables the user to use only one wallet for purchases on any site on the web. The wallet contains an online shopper's ID, payment information, shipping addresses, and more. It is said to be more convenient to customers, provides interoperability standard, improves privacy, and provides benefits to banks (Berst, 1999b).

2.3   Benefits Of Implementing Online Payment

Online payment offers a lot of benefits to the organizations that implement it. The technology could improve cash flow management and operating efficiencies, increase company's participation in customer's acquisition process, compress the business cycle of the company and intensify the company's relationships with its business partners (Ratnasingham, 1998).

Online payment technology is also said to be able to reduce cost, increase the number of customers for the company, enhance the relationship between the customers and the company and improve the company's image. The bottom line is increase in revenue and consequently in the profitability of the company.

Perhaps the most interesting benefit of online payment is the ability to couple it with online bill presentment or electronic billing systems (e-billing). E-billing systems automate both the delivery and the payment sides of the billing cycle with the entire exchange taking place over the Internet (Radecki & Wenninger, 1999). E-billing eliminates the conversion of computerized information to, and from paper, and replace the physical delivery of documents. There are three models proposed for electronic bill presentment and payment operating models, namely the direct model where a biller establishes and electronic billing capacity on its own web site, the service provider consolidation model where a central service provider consolidates electronic bills from different types of billers, and the customer consolidation model where the electronic content is delivered directly to the customer (NACHA).

There are numerous benefits for organization that implement online billing delivery and payment. Merchants can save printing and mailing cost (Tedeschi, 1999a). E-

billing also has the potential to reduce the time it takes to deliver bills and receive payment, which means that organizations can receive the payment earlier and invest it somewhere. The organization could also retain their current customers (Radecki et. al.). Meanwhile, customers can obtain a wealth of information about their account (Tedeschi, 1999b). It is also an added convenience to the customers (Radecki et. al.) and enable the customers to save postage or check-processing fees (Tedeschi, 1999a).

Survivability could also be a factor that thrust the companies into using online payment. For the time being, not many companies, either the suppliers or the business clients of the companies use online payment. However, things might change in the future and many companies might adopt online payment. When this happens, the companies that deal with these companies have no other choice but to use online payment. If not, they would lose the business and this spells disaster to the companies. Therefore, the use of online payment systems by suppliers and business clients would push the companies to use online payment.

2.4   Barriers To Implementing Online Payment

The projected number of Internet users in Malaysia will be two million by 2002 while Internet commerce is expected to increase from RM 174.8 million in 1999 to more than RM 3.8 billion (The Star [In-Tech], July 1999a). Meanwhile, e-commerce revenues between companies are expected to be US$1.3 trillion by 2003 and consumer web auctions are expected to chalk US$12.6 billion. Furthermore, online bookstores which also sell music and video can be expecting somewhere around US$6.8 billion in 2003 in revenues (Hogan). However, a quick count at two

Malaysian web sites revealed that there are only 31 cyber shops in Malaysia (Malaysiasearch) and only 27 accept online payment (Merchant Plaza). Although these figures cannot be accepted as the whole picture of online payment in Malaysia, it does give a rough idea of where Malaysian companies stand in terms of online payment implementation. The question now is, with all the money that e-commerce is expected to generate, why aren't the companies in Malaysia move quick enough to start using online payment systems?

The explosive growth that had been predicted for e-commerce has been somewhat dampened by the technical problems of paying goods purchased on the Internet (Larson, 1999). Skeptics even pointed out that e-payment vehicles are not likely to displace cash, checks, and credit cards in the near future (Bank Systems & Technology), while others argued that there are more to lose than to gain through online payment (Stoneman, 1998). The problems could be attributed to security (Levinsohn, 1998), legal, and technical concerns which also apply to Internet banking (FICS Group). The other concern could be social concerns (Ratnasingham, 1998) and business suitability concern. These factors are the main barriers which have to be resolved for online payment to be embraced fully by the business organizations in Malaysia.

In electronic commerce, security covers four separate attributes. The attributes are authenticity, integrity, non-repudiation and confidentiality (Wilson, 1997). In fact, confidentiality of the transactions content and the authentication of identities involved in the transactions are essential elements of a commercial transactions (Liddy & Sturgeon, 1998). This concern stems from the fact that hackers or intruders can get into a company's internal network through the Internet and do

damage to the system. Hackers can infect company's files with viruses and also find important information about the company. Worse still, it seems that the criminals always seem to be one step ahead of law enforcement agencies (Forcht & Wex, 1996).

The key to unlock the security concern is trust. Thus, we need a different model of security and trust for e-commerce. The elements in the new model are trust, risks, controls, and perceived security. The trust element relates to the information content and the process applied to it. The risks element consist of technical risk, personnel or management risks, and legal risks. The control element's classes are deterrent, detective, corrective, and preventive. All these three elements will move towards the fourth and the most important element, which is the perceived security element (Ratnasingham, 1998).

The security concern relates closely to the legal concern of online payment. It is because online contracting raises novel legal issues (Belgum, 1999). In electronic business, these problems will crop up : identifying terms of contract, establishing when a contract has been formed and proving that a party did in fact send a particular message in the absence of the normal documentary of proofs (Pattison, 1997). Thus, e-commerce raises three fundamental legal issues : Is it legal? Can I trust the message? What are the rules of conduct? (Smedinghoff & Bro, 1999). As the transaction moves online, the parties involved need to be assured that the value stored in, or transferred by the system should be treated like bank money (Kreltszheim, 1999). Further complications arise if the business decides to go global. Then, the company is subject to the law of the foreign countries and problems might occur if the countries are highly regulated ones (Pattison, 1997).

What should the companies do in view of all these problems? Should it only trade online locally and revert to conventional payment method? These measures are not smart measures. In fact, measures are already taken to resolve the above issues. Among them are the use of private and public key, digital signatures, and digital certificates. Private and public key is used to authenticate the identities of the parties involved in an online transaction. Digital signatures are *signatures* that are created, communicated and stored in an electronic form. It serves three critical purposes for the parties engaging on e-commerce transaction : to identify the sender, to indicate the sender's intent, and to ensure the integrity of the document signed (Smedinghoff et. al.). Digital certificates serve as an online identity cards for individuals or organizations that wish to do transactions online (The Star [In-Tech], July 1999a).

United Nations Commission on International Trade Law (UNCITRAL) has formed a Working Group on Electronic Commerce to prepare uniform rules on digital signatures and certification authorities (Smedinghoff et. al.). This should ease the problem on doing online business globally. On the local front, laws have been passed to regulate e-commerce and online communications. The Computer Crime Bill (1997), is an act to provide for offences relating to the misuse of computers. The most important law passed thus far concerning e-commerce is Digital Signature Act (1997). The Act is a comprehensive act to regulate the licensing and duties of certification authorities, plus the regulation of the use of digital signatures. Furthermore, the government has appointed Digicert Sdn Bhd, a joint venture between Pos Malaysia and MIMOS as Malaysia's first certification authority to issue digital certificates (The Star [In-Tech], July 1999). The upcoming personal

data protection bill would add depth to the existing acts concerning e-commerce and online payment. These legislation can and will remove the barriers and promote the desirable public policy goal of e-commerce : trust and predictability (Smedinghoff, 1999).

On the technological part, panellists in one survey said that the electronic payment vehicles have developed slowly and require more industry standardization. Technological compatibility is another issue that has yet been fully answered in electronic payment (Bank Systems & Technology). Even the application software is not yet standardized (Evans, 1999). The slow development of an industry standard happens because vendors are too greedy to cooperate on a standard. It seems that every company want a proprietary brand that would enable them to own the market (Berst, 1999a). All these have led to more companies shying away from online payment. They prefer to wait for the industry to come with a standard before joining in the crowd of online payment implementers.

As a payment system, the Internet is still in its early stage (Levinsohn, 1998). As a new payment medium, it is not surprising that there is an emotional insecurity for the fear of reliability in the new system. This, followed by local/cultural factors, add to the resistance of the consumers to use online payment, making it not so appealing to the business community. Furthermore, there is an existence of *herd mentality*, where business and society wait for the larger crowd to start using and implementing online payment before they themselves start doing it (Ratnasingham, 1998). Thus, social factors cannot be denied as one important barrier to online payment implementation.

The nature of the business entity determines whether it will want to use online

payment or not. Companies that distribute all their products (or most of it) online will find that there is a strong need for online payment. This is because payment and product distribution channels are connected symbiotically : one enables the other (Levinsohn, 1998). This is also the reason why pornographic sites have become e-commerce success stories because they are perfecting membership/payment or procurement/transaction processing (Berst, 1999c), plus the fact their products can only be distributed online.

Furthermore, there are also consumer cost differences for traditional markets compared to the Internet markets. Price, search costs and sales taxes are lower in the electronic markets compared to the traditional markets. However, risk cost, distribution costs, and market costs are higher in the electronic markets than the traditional markets (Strader & Shaw). There is also a legitimate fear that online payment, especially those using credit cards, will increase the cost, and ultimately, the price of the products. This makes the system unattractive for low value transactions (Patty, 1997).

It is not right to say that the government is not doing enough to promote online payment in this country. A Framework For E-Commerce, chaired by the Prime Minister himself, had already been setup to create the right environment for e-commerce to flourish in this country (National Framework For E-Commerce). On top of that, the Energy, Communications and Multimedia Ministry has prepared a National E-Commerce Master Plan which will address, among others, the issue of bringing down the cost of doing e-commerce in Malaysia, ensuring universal and secure access to the communication infrastructure, and promote greater awareness within the local business community (The Star [In-Tech], July 1999b).

Furthermore, four credit card issuing banks, Hong Leong Bank, Maybank, Public Bank, and RHB Bank, have become pioneering members of the national SET payment gateway which is managed by Malaysian Electronic Payment System Sdn Bhd (MEPS) (Computimes Malaysia, 1999). These developments show that there are actions taken to promote the viability of online payment in this country.