

A Framework for Measuring ICT Adoption in the Travel and Tourism Sector

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Abstract

The travel and tourism sector has been an initial as well as major adopter of Information and Communication Technologies (ICTs). However, after several decades of ICT adoption, the degree of adoption as well as use of ICTs among travel and tourism related enterprises have been quite uneven. There exists large variation among these enterprises in their use of ICTs in their service delivery activities. The paper puts forward a conceptual model to explain the ICT adoption process in travel and tourism sector. The model incorporates the usage diffusion model instead of the adoption diffusion model for explaining the adoption process. The model also presents a framework for measuring the usage pattern of ICTs among the enterprises using the service delivery approach.

Key Words : Competencies, ICT, Travel and Tourism Industry, Usage-diffusion

Introduction

The travel and tourism sector has been witnessing a surge in terms of the adoption of Information and Communication Technology (ICT). Whether it is the rapid penetration of the online booking systems, the Global Distribution Systems or the compilation of loyalty programs through the effective use of Customer Relationship Management systems, the variety and intensity of use of ICT in the travel and tourism sector is increasing by leaps and bounds. As Poon (1993), has

stated, "a whole system of information technologies is being rapidly diffused throughout the tourism industry and no player will escape information technologies impacts". While the penetration process is quite rapid by industry standards, it is quite interesting to understand the dynamics of the diffusion process, analyze the drivers of the adoption process and develop an effective measure for describing the whole phenomena. The travel and tourism sector is characterized by the existence of a plethora of operators with varying functions and responsibilities. These operators extend

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from the actual service providers like hotels that are generally located far away from the customers to information providers like tour package marketers who are located near to the customers. Though interlinked, the level of autonomy enjoyed by most of these operators from each other is quite high, unlike in other sectors like manufacturing, which probably impede a uniform adoption process. From a customer perspective, the consumption process with regard to the tourism product can be described in terms of passing through distinct stages that extend from information search about the destination and the transportation mode to the actual service encounter to post-service experience activities like subscribing to a loyalty program offered etc. after the service encounter. This diversity in the activity profile of the supply side enterprises coupled with the high levels of autonomy enjoyed by them and the distinct stages through which the customer passes to experience the tourism product infuse high complexity in the diffusion process of ICT among the travel and tourism related enterprises. This is because different entities with multiplicity of responsibilities in delivering the product would have diverse orientations both in terms of attitude and in terms of the belief about the ICT to achieve their primary and secondary goals leading to a situation where the level of ICT adoption by entities at one stage of the value chain are not matched by the level of ICT utilization at another stage. Further, there could be differences in the capabilities of entities in terms of adoption of ICTs in the value chain. Another factor to be considered is the multitude of ICTs being developed and offered to the tourism sector. Buhalis and Licata (2002) list down some recent technological advances like the Interactive Digital Television, mobile commerce, that are increasingly being lapped up by the industry. The abundance of ICT based innovations with respect to travel and tourism sector also result in greater complexities with regard to tracing the adoption process in the travel and tourism industry. The paper presents a framework for conceptualizing and measuring the adoption of ICT in the travel and tourism industry by looking at the factors that propel the adoption process as well as the unique characteristics of the industry.

ICT in the Tourism Sector

The wide use of the information and communication technologies has transformed the tourism industry beyond recognition. While the level of adoption and use of the ICTs vary within the different players, the scale and scope of the adoption have been expanding in a consistent manner over the last two decades. According to Forrester research (1999), the number of online

reservation for holiday travel is expected to touch 65 million in the year 2003 from a value of just 8 million in the year 1998. Marcussen (2004), estimated that the online travel sale in the Europe itself had increased by about 43% from 2002 to 2003. According to his study the on-line travel market presently constitutes about 11% of the total travel market in Europe and this is going to reach 20% of the overall market by 2006. The opportunity to market one's hotel or airline 24 hours a day 7 days a week to the entire world has provided enormous opportunities for the tourism industry. As they say "if you are not on-line you are not on-sale". According to OECD (2000), the advent of the internet-based e-commerce has offered considerable opportunities for firms to expand their customer base, enter new product markets and rationalize their business. Cooper et. al. (1998), feel that the new technologies have had a major effect on the operation, structure and strategy of tourism organizations throughout the world. The new technologies have enabled a reduction in the communication and operational costs and have paved the way for a significant enhancement in the flexibility, interactivity, efficiency, productivity and competitiveness. According to Connolly and Olsen (2000), technology is going to be the most important competitive weapon for any hospitable company. They feel that information technology is the single greatest force affecting change in the hospitable industry.

An issue that assumes great significance in this context is the rate of adoption of ICT in the travel and tourism sector. While the adoption is considered to be steadily improving, the rate of adoption is not considered to be very satisfactory among the conventional travel and tourism related enterprises. Most of the ICT adoption is in fact assumed to be made by new players in the travel and tourism sector. The perceived reluctance of conventional travel intermediaries and service providers to embrace the World Wide Web and other ICT enabled technologies at a rapid pace have raised serious concern among observers of the travel trade. Sensing this slow rate of adoption, Reinders and Baker (1997), predicted that the high street retail travel agents will be reduced by 15% to 20% in the next few years. While this has not yet happened, the potential of e-intermediaries to substantially affect the market shares of conventional intermediaries remain high unless there is a surge in the adoption of ICTs among the latter. It is observed that many of the e-intermediaries who have come to the trade happen to be new players or players who were earlier in the information technology field indirectly associated with the travel industry. The adoption rate is also found to be quite uneven across the

travel and tourism sector with wide variations observed across geographical regions.

The adoption process for ICTs among travel and tourism related enterprises is difficult to be measured in a structured manner since the user firms adopt ICT and e-commerce for different purposes with different levels of intensity. For instance, Standing and Vasudevan (1999), in their study on the diffusion of the world wide web among travel agents in Australia found that although 50% of the respondents use electronic mail, almost 60% do not have a web-site on their own and do not have immediate plans to do so; thus, indicating a variation in use of the available ICT. Even among tourism sector players with web-sites, the extent of use of the web-site varies considerably. Suh and Kim (2002), in their study of the web-sites of the Destination Marketing Organisations of 20 APEC member countries, found significant divergence among them in their customization, connection and commerce functions. The conventional model of adoption process may not therefore be completely appropriate to describe the adoption process of ICTs in the travel and tourism sector since the conventional models measure adoption as a dichotomous concept where the population is divided in terms of either adopters or non-adopters (certain adoption diffusion models portray the adopters into three categories: adopters, non-adopters and those who adopted but later rejected the technology). In the specific context of the tourism industry, this dichotomous classification may not always be valid. This is because, in practice it is difficult to visualize a travel and tourism related enterprise procuring and using all possible ICTs in one sweep, rather, the enterprise may gradually start utilizing the components provided by ICTs and begin to utilize its full potential over a period of time. Technically, the enterprise has adopted ICT from the day it has started using any of its applications, but in practice unless the full potential is achieved, it is difficult to consider the adoption process to be complete. The adoption process in practice therefore, advances by degrees and not in a dichotomous manner. Thus, the Use-Diffusion model, an alternative to the adoption-diffusion model, seems to be more valid in explaining the phenomenon of ICT adoption.

The Use-Diffusion Model

The use diffusion (UD) model unlike the adoption diffusion (AD) model focusses more on the extent of use rather than on the act of adoption. The main difference in conceptualization is that in the AD model, the variable of interest is the rate or time of adoption while in the UD model the variable of interest is use, or more specifically

the rate of use and the variety of use. The use diffusion model is hence, considered to be more appropriate for consumer technologies for which the inherent complexities and the nature of evolution tend to prolong the trajectory and time-scale of diffusion (Shih and Venkatesh, 2004). In the UD model applied here to conceptualize the adoption of ICTs in the travel and tourism industry, adopters are categorized in terms of the variety of use of ICTs as well as the rate of use of ICTs. The usage is thus conceptualized as comprising of two distinct dimensions. The variety of use dimension refers to the different application of ICTs that are being tried out by the firm while the intensity or usage rate dimension considers the extent to which each of these applications are being used.

The Conceptual Model for Adoption of ICTs in the Travel and Tourism Industry

The figure.1 shows the basic model of the adoption process for ICT in the travel and tourism sector. The model has three basic components: the determinants of adoption, the adoption pattern and the outcomes of adoption. The usage diffusion pattern of ICTs is determined by certain operational domain related and environment related factors and the perceived outcomes that emerge out of the use of ICTs influence the rate of continuation of the adoption process. The conceptual model is analogous to the models proposed with regard to the adoption of e-commerce or the internet in households (Shih and Venkatesh, 2004), and in business organizations (Zhu, Kraemer and Xu, 2002), which in turn bases its assumptions from the Net Enabled Business Innovation Cycle (NEBIC) paradigm introduced by Wheeler (2002). The model also derives broad support from some of the empirical studies done in the past in this sector.

The Determinants of Use Diffusion

The model proposes three main categories of determinants that are expected to influence the use diffusion in travel and tourism firms. These determinants are associated with the (i) geographic location of the firm, (ii) the internal characteristics of the firm as well as (iii) the market conditions in which the firm operates. This is a modification of the Tornatzky and Fleisher's (1990), technology-organization-environment framework, which identifies three aspects of a firm's context that influence the process by which it adopts and implements technological implementation: the technological context, the organizational context and the environmental context. This modification is made to suit the context of the travel and tourism industry

Technological Environment and Use Diffusion

The technological environment is defined in terms of the state of the ICT infrastructure available in the geographical location of operation of the travel and tourism related enterprise. The ICT infrastructure would consist of such factors like the ICT technologies available in the country, the prevalence of ICTs in the country including telecommunication access paths, broad band penetration rates, internet hosts, number of web-sites, internet access price etc. A travel and tourism enterprise located in a country with high levels of ICT development will find it much easier to adopt and use ICTs than an enterprise located in a country with low levels of ICT development. Suh and Kim (2002), report that among countries in the APEC region with low ICT development, the main barriers for ICT adoption were limited knowledge of available technology cost of system maintenance, insufficient e-commerce infrastructure, cost of securing skilled human resources for e-commerce maintenance etc. These factors are all directly linked to the inadequacy of ICT technology infrastructure. Lack or high cost of IT infrastructure prevents even the innovative travel and tourism enterprises from trying out the latest ICTs available in the world market, thereby smothering adoption. If the infrastructure is very unreliable, the fear of losing or disappointing customers will make the enterprises reluctant of utilizing the available technology. Since the travel and tourism sector is very sensitive to the customer satisfaction, until the technology available is totally reliable and convenient, the enterprises will consider it a risky proposition to rely on the ICT during the service encounter.

Firm Context and Use Diffusion

The four variables that comprise this determinant are: firm size, firm scope, internal environment of the firm and the newness of the firm. Firms with large resources can be expected to invest more on ICT technologies. One reason for this is of course the ability to generate enough revenue from the costly investments is more for large firms than for small firms. The cost incurred comprises of both the initial cost as well as the maintenance cost. Thus, hotel chains or large Airlines with big fleets are more capable of investing in ICT technologies and use them widely than firms with stand alone hotels. In the context of the adoption of Electronic Data Interchange, Ahlin (1991), Banerjee and Golhar (1994), and Smith (1990), have found empirical evidence to show that small firms are generally reluctant to adopt technology. Further, Wei et. al. (2001), in their study among hotel managers found that in large hotels,

e-mail facility is used by managers to contact with outside organizations like suppliers and travel intermediaries more in comparison to small hotels. In the same study they found that large hotels used professionals and experts to build their home page which indicates the importance attached by large hotels for the variety of services that can be provided through the World Wide Web.

Firm scope relates to the different activities that a firm is involved in. A hotel for instance, could provide just rooms to stay or think of providing additional facilities like a convention center, conducted tours, taxi service etc. As the firm scope increases the likelihood of adoption, and use of ICT is expected to be great. While empirical support to this proposition from the extant literature is scant, a few studies indirectly hint at this relationship. Wei et al (2001), in their empirical study found that Conference conventional hotels are more probable to have room availability data on their websites, while resorts have more probability of using the web-site to offer a virtual tour of the rooms. This is explained by the fact that convention/ conference hotels being more interested in business and repeat customers feel room availability information being a more important information that would help their customers, while resorts which target new customers looking for a leisure are more attracted by the virtual tours. This suggests the use of the web for specific purposes based on characteristics of the hotel. Also, this points towards the web-site being used as a positioning tool to attract specific segments of customers. Hence, if the travel and tour firm has more characteristics to promote or attempts to target more segments, the e-commerce effort which is a component of the ICT use will reflect that. Dewan et. al. (1998), from their empirical study have found that diversified firms are generally more keen on IT investment than firms which are not diverse in their scope. Thus, they attribute to the greater need for coordinating the resources in diversified firms. The internal environment of the firm is also a strong determinant of the use adoption of ICT. The internal environment encompasses a multi-dimensional factor, which includes the level of perception about the benefits derived from the use of ICT among the members of the organization as well as the general innovative tendency of the firm. When the perceived benefit is stronger, the firm will naturally achieve a high level of user adoption level. This proposition has been supported by Iacovou et. al. (1995), in their study of the adoption of EDI among small retailers. Firm innovativeness as a determinant of use-diffusion of ICT in travel and tourism based enterprises is consistent with the dynamic capability theory for assessing net enablement proposed by

Wheeler (2002).

The newness of the firm affects the usage diffusion state of the firms, since firms which are relatively new to the sector are devoid of legacy systems and hence, can leapfrog to adopt new technologies. The instance of low-cost airlines illustrates this point. In these airline companies, ticketing is almost totally online without relying on the established travel agencies. New concepts like e-ticketing are widely used by these airline companies. The new companies generally would face very few hindrances in adopting new ICT based technologies. In fact many new firms will try and use path-breaking ICTs as their competitive advantage.

Market Environment and Use Diffusion

The market environment determinant comprises of two variables customer readiness and the competitor's level of adoption. The customer readiness concept, introduced by Zhu, Kraemer and Xu (2002), indicates the extent of willingness of the customers to accept the new technology as part of the service offering. If the firm's customers are well accustomed to the new technologies and are willing to use them at various stages of the service encounter, then the travel and tourism based enterprises will be more motivated to adopt and use it very widely in their service offerings. De Kare Silver (1999), in his book on e-shopping uses this as a criteria to assess whether a particular product can be successfully retailed through the World Wide Web. The competitor level of adoption is a significant variable that influences use diffusion. Many studies have empirically proved that the competitive pressure has been a major driver of innovation (eg. Crook and Kumar, 1998; Grower, 1993; Iacovou et. al., 1995; Premkumar et. al., 1997).

Use Diffusion Patterns in Travel and Tourism Based Enterprises

The usage patterns which effectively capture the stage of adoption of the firm, are measured in terms of two dimensions: variety of use and rate or intensity of use. Variety of use refers to the different ways in which ICT can be put to use in the firm. For example, a hotel web-site can be used for a range of purposes from giving general information about the hotel to allow customers to book rooms on-line to create an on-line community of customers. A hotel may actually be using all or a few of these facilities that are available. Rate, or intensity of use on the other hand refers to the extent to which a facility is being used. The rate of use of the web-site can be measured in terms of the percentage of rooms being booked through the web-site or the extent of reliance on the on-line community by the hotel for various

promotional programs. Although, it is possible that variety and rate of use may be correlated, it need not always be so. It is quite possible that a hotel may have a good web-site with all the attendant facilities, but, still rely heavily on conventional intermediaries for its operations due to various environmental and contextual reasons. For use diffusion to be effective, both the variety and rate of use have to be high.

Based on these two dimensions the adopters can be categorized into four groups. Intense users are defined as firms which use ICT to a variety of purposes and to a significant degree while non-specialized users are just dabbling with the technology without extracting the maximum from all the possibilities. They may have adopted a variety of possibilities, but their use of these patterns remains very minimal. Specialized users have adopted a few technological possibilities but are using these to a very high degree, and limited users are firms which are neither adopting ICT to a reasonably good level nor are they utilizing the few technologies that they have adopted. These four typologies capture the various types of travel and tourism based firms in terms of their adoption and use of ICTs. At any given time the typology represents four sets of user segments. However, user identities need not be fixed over time. For instance, a specialized user may realize the advantages of using the technologies more intensely, and hence, graduate to an intense user.

Measuring the Usage- Diffusion in Travel and Tourism Based Enterprises

While the topology of usage pattern effectively captures the various categories of firms on the basis of their level of adoption, measurement of the variety and rate of use still remains quite difficult in travel and tourism based enterprises. This is because the plethora of uses that ICT can find in these enterprises and also the difficulty in adopting a framework for measuring the rate of use. This difficulty can be reduced by using the consumption process in the travel and tourism sector. A modification of a model proposed by Mathieson and Wall (1982), gives insights in this regard. Mathieson and Wall's model considers travel buying behavior as comprising of five stages: (i) felt need/travel desire (ii) Information search and evaluation (iii) travel decision (iv) travel preparation and (v) Travel satisfaction evaluation. While this model suits perfectly to describe a normal travel process, for the purpose of measuring the ICT adoption in the travel and tourism product a modified model is suggested. While capturing the essence of the earlier model, a new modified model consisting of similar stages is proposed. In this model, the stages are described as: (i) felt need/ travel desire (ii) Information

search and evaluation (iii) confirmation of transaction (iv) Actual service experience (v) Post-experience behavior. The first and second stages of this model are similar to the stages in Mathieson and Wall's model. The third stage involves the decision on transacting with a particular service provider. The simplest act that typifies this stage is the act of booking a room in hotel or a seat in an Airline. This stage is very important from the part of the ICT use perspective since several technologies are presently applied at this stage of the travel process. The fourth stage involves the actual service experience, when the customer actually experiences the service provided by the service provider. The fifth stage involves the various Post consumption activities that the consumer might indulge in after the service encounter like signing up a loyalty program or being involved in word of mouth promotion.

The ICT usage by any travel and tourism based intermediary can be looked at from the point of contributing to the customer experience in each of these five stages. For instance, the firm can use Internet marketing strategies using search-engine optimization techniques or mobile commerce in the first stage to generate a desire for a destination. In the second stage, the web-site content can be used very creatively to aid the customer during the information search phase, where in streaming video or other methods of interactive on-line promotion using the latest multi-media technology can be used. In the third stage there are ICT enabled facilities like on-line real time booking, e-ticketing etc. that are used to facilitate transactions. At the fourth stage, the various ICT based facilities that are being adopted include wireless internet in rooms, e-check in, e-check out etc. that can directly improve the quality of the service encounter. Also, the service provider can improve its operations by deploying ERP systems in its organisation which can indirectly improve the service for the customer. During the post-experience phase the firm can extensively use CRM based modules to bind the customer to a mutually profitable relationship so that it can facilitate one-to-one marketing in the future. The ICT deployment possibilities in the travel and tourism industry are therefore, numerous and hold the potential for substantively transforming the service delivery of the travel and tourism industry. The examples quoted above are just illustrative of the range of ICT based facilities that can be deployed to enrich the customer experience at each stage in the service encounter. Figure.2 presents a diagrammatic representation of this process.

As the figure shows, the essence of measuring the use-diffusion stage of an enterprise is finding answers to the three questions given on the right with regard to the five

stages for the enterprise. The answers to these questions will make it possible to place the firm in any of the four categories of the use diffusion model. While the answer to the second question addresses the variety dimension the answer to the third question is concerned with the rate of usage dimension.

Outcomes

The use-diffusion process could lead to a positive or negative perception of the impact of the use of ICT. This perception is an outcome of the adoption of the ICT in the enterprise. This could in turn determine the degree of the use-diffusion that the firm is going to witness in the future. The feedback arrow represents this relation. A firm which was using a variety of technologies at a minimal rate could, after getting convinced about the positive impact of ICTs may start using all these technologies at a greater rate, thus, moving itself from a non-specialized user status to an intense user status. Conversely, a firm which was using a few technologies in an intense manner could procure more technologies after getting convinced about the utility of the technologies and pass from a specialized use status to an intense use or non-specialized use status based on the rate of use of the new technologies. The degree of use-diffusion in the organization could also directly motivate the future level of use-diffusion to be adopted by the firm. This is mostly because of the increase in the familiarity level of the firm with the technology.

Conclusion

Tourism industry was one of the first sectors to be benefitted by the IT revolution. The earlier CRS and GDS have given way to new on-line intermediaries and customer relations management. It is also estimated that out of all the on-line transactions involving end-consumers, the maximum occurs with regard to the tourism sector. The unique nature of the tourism sector with a lengthy service delivery chain and the multifarious activities that go towards completing the service delivery makes the adoption possibilities of ICT immense. At the same time due to the high degree of autonomy enjoyed by most of the enterprises, and the wide variation in the enterprise size and scope make the ICT adoption a very complex process. The model described above provides a framework for analyzing the adoption process of ICT in travel and tourism related enterprises. The model tries to capture all the complexities in the travel and tourism sector. The usage diffusion framework proposed by the model enables a more realistic and practical categorization of the adopting firms. This is because of the multifaceted, varied and complex nature of the activities that comprise the task environment of any travel and tourism related

enterprise make it difficult for a one-dimensional framework for explaining the adoption process. Also the evolving nature of the ICT provides a multitude of options for the enterprise to try out. The framework for measuring the usage pattern tries to look at the whole process from the service delivery perspective. The measuring framework thus, tries to bring clarity in the identification and measuring the rate of use of different ICTs. The model can be put to a variety of uses

especially in policy making. The model can be used to compare service providers at the same stage in the tourism value chain across different countries to generate a status report of the ICT adoption among tourism enterprises. This will provide valuable inputs for policy development in terms of encouraging the ICT adoption process. Also it could give insights into the evolution of the tourism industry and the trends in the value creation. This framework can also be used to

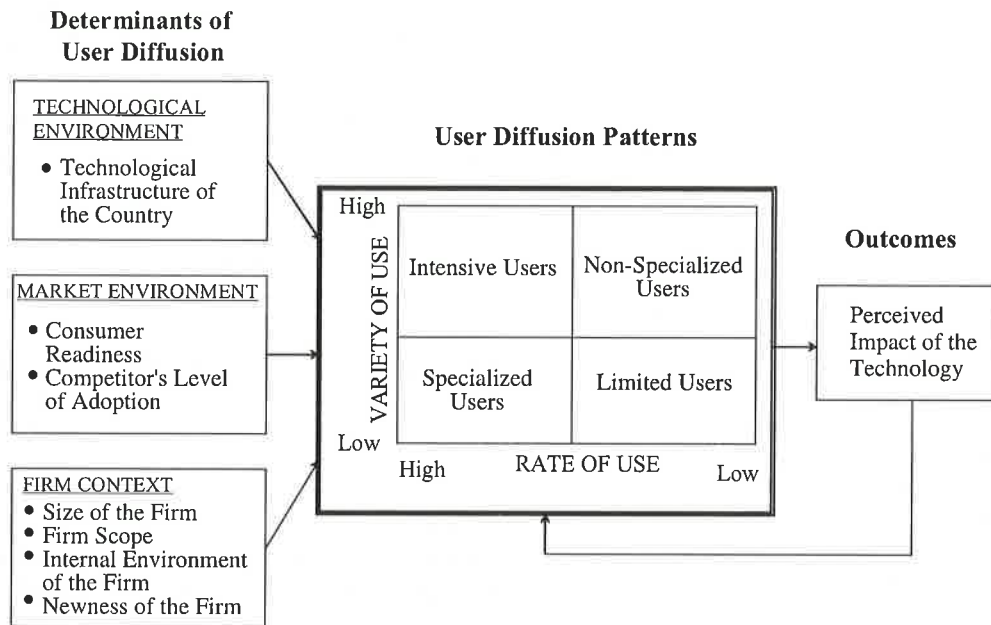


Figure I The Usage adoption model for ICT adoption in the Travel and Tourism sector

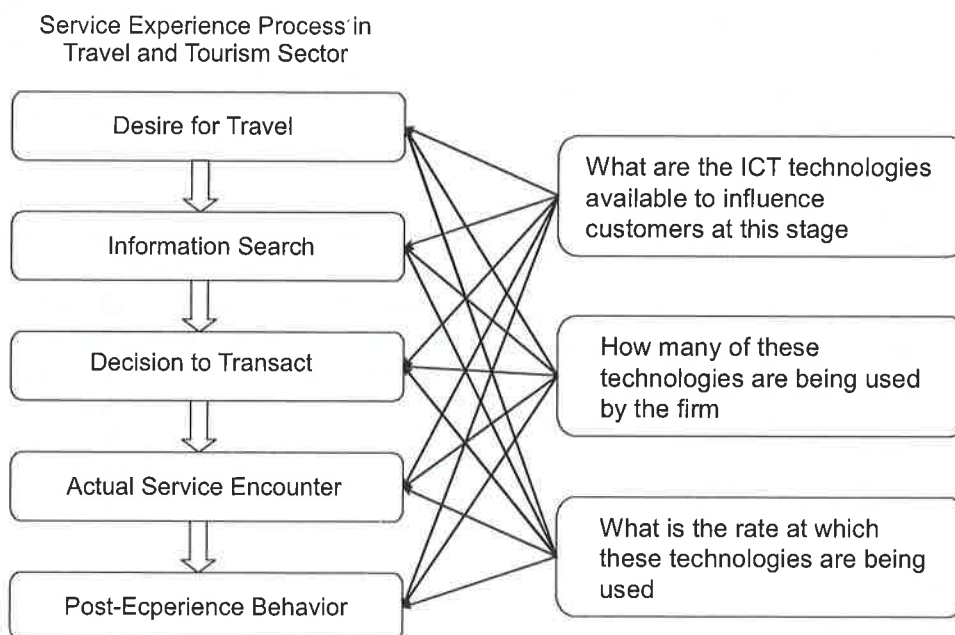


Figure II A framework for measuring the ICT adoption in the travel and tourism sector.

measure the level of ICT adoption of enterprises that operate at several stages of the value chain in the same country. This type of analysis will be able to understand the internal dynamics of ICT adoption in the tourism sector of a region. For instance, if the level of ICT adoption is very high at a particular stage and is very low at a preceding stage, then there exists a major disparity in the ICT adoption process of that region which needs to be immediately bridged.

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