



## Perceived risks and customer needs of geographical accessibility in electronic commerce

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### ABSTRACT

*Customer needs of geographical accessibility* still plays an important role in electronic commerce, though the extent to which it does so varies according to the characteristics of products, services and the market strategies of firms. In this study, factors affecting *customer needs of geographical accessibility* and their structural relationships were investigated through a customer survey and statistical analysis using the methods of confirmatory factor analysis and structural equation modeling. The result shows that the three independent factors, *unease of delivery*, *complexity of services*, and *trust and reliability* affect significantly *customer needs of geographical accessibility*, with *perceived risks of distant orders* being a mediating factor in the relationship.

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### 1. Introduction

Recently, electronic commerce and new technologies have changed customer perceptions concerning geographical accessibility to service providers, thereby expanding the reach of market areas. With many intangible products such as online games, software, education, music, and videos, geographical distance no longer works as a barrier to making transactions. Moreover, successful transactions are even being made for some tangible products in markets that have a broad geographical scope. The reason for this is the fact that many service processes for intangible products can be substituted efficiently by digital technology applications, and sometimes, electronic commerce can provide greater convenience even in transactions involving tangible products. However, in many other cases, overcoming the barriers of distance and expanding the geographical market scope in electronic commerce, largely depends on the characteristics of products/services and the market strategies of individual firms. Some customers may prefer to have face-to-face interaction with accessible physical location when conducting transactions, thereby retaining service quality and diminishing the perceived risks of long-distance orders. This requirement is more apparent in markets populated by small and medium sized electronic commerce companies and in the case of new start-up companies in the process of launching new businesses in electronic commerce. This study does not attempt to deny the contribution made by electronic commerce to overcoming the barriers formed by distance in relation to several successful products

or industries. It does however propose the adoption of a new framework to analyze the influence of geographical accessibility in electronic commerce, in order to provide strategic insights into the geographical scope of markets and operational issues for firms that are planning to launch new businesses.

The concept of geographical accessibility is a critical factor in operational strategies and distribution network design (Mols 1999), and is related to the determination of how geographical market scope affects diverse marketing strategies in electronic commerce. On these grounds, the concept and its influences merit serious study. In this research, several factors are identified and their relationships with *customer needs of geographical accessibility* are investigated. Three independent factors such as *unease of delivery*, *complexity of services*, and *trust and reliability*, and an additional mediating factor of *perceived risks of distant orders* have been adopted following a review of previous studies, and their relationships with *customer needs of geographical accessibility* were tested. The methodology used for this study involved conducting a questionnaire survey to collect data, which was then analyzed using two statistical methods, 'confirmatory factor analysis' and 'structural equation modeling'.

The paper is organized into five sections. The first section is the introduction. The second section explains selected factors critical to our understanding of *customer needs of geographical accessibility* based on a review of existing literature and current case studies, and the process of developing the hypotheses is addressed. The third section describes the data and methods used in the analysis. The fourth section reports the results of tests of the research model and relationships between constructs adopted by a review of previous studies. In fifth section, the overall results are summarized

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and implications for the management of electronic commerce are discussed. Concluding remarks and future research subjects are provided in the sixth section.

## 2. Theory, research model, and hypotheses

In traditional economies, geographical accessibility was an unavoidable factor in service industries, including retailing, for diverse interactions between service providers and customers. The two spatial interaction models – ‘distance decay model’ and ‘gravity model’ (Senior 1979, Taylor 1971) – explain the effect of geographical distance in mutual interactions. The general distance decay model describes the phenomenon of declining interactions with increase in distance. The gravity model reflects the differences in the geographical attractiveness of physical company locations in their spatial interactions with customers or other companies. For example, the size of a company can play a role in expanding the geographical market scope and lessening the reduction in interactions as distance increases. The formula of the most widely used in the distance decay model is as below:

$$z_j = \frac{f(\{z_i\})}{d_{ij}^\beta}, \quad \beta \geq 0$$

In this formula, the value of geographical interactions at location  $j$  ( $z_j$ ), associated with other location  $i$ , is modeled as a function of attribute values  $z_i$ ,  $f(\{z_i\})$ , which represent geographical attractiveness of location  $i$ , and is weighted by the inverse of the distance separating location  $i$  and  $j$  ( $d_{ij}$ ). The  $f(\{z_i\})$  might be composed of a range of potential attributes for geographical attractiveness such as size of facilities, reputation of a company, and infrastructures for accessibilities. The exponent  $\beta$  has the effect of reducing the influence of the location as the distance increases. When  $\beta = 1$ , the impact is linear while distance has no effect when  $\beta = 0$ . In addition, when the value of  $\beta > 1$ , the geographical attractiveness of a location diminishes rapidly as the distance to this location increases. Evidence of distance effect with respect to distance decay parameters is found in much of the geographical literature on theoretical and applied approaches. Fig. 1 shows a representative distance decay relationship with distance increase according to traditional general models.

In addition, distance has been a very critical dimension in operations and marketing management, particularly with regard to decisions concerning geographical scope of target market, building of distribution networks, and designing efficient operation system which enable cost reduction. However, electronic commerce is changing the concept of geographical accessibility and in doing so the geographic pattern of networks thereby overcoming barriers of geographical distance in transactions (Boyer et al. 2002, Cho

2007, 2005; Cho and Park 2003, 2002; Mols 1999). A notable example of this is the way increasing use of online banking has changed the shape of branch networks, reducing branch numbers (Greenland 1995).

Customer perceptions and their requirement for geographical accessibility in transactions plays an important role in determining the distance effects, but *customer needs of geographical accessibility* can itself be changed through electronic commerce. This study proposes the research model shown in Fig. 2 based on a review and synthesis of existing literatures on customer needs of geographical accessibility (Cho 2007, 2005; Cho and Park, 2003, 2002; Kim et al. 2008, Lim 2003, Teo and Yu 2005) and perceived risks (Cheng et al. 2008, Kim et al. 2008, 2009; Korgaonkar 1982, Lim 2003, Teo and Yu 2005) in electronic commerce. In particular, this study is fundamentally based on the author's three previous studies on customer needs of geographical accessibility (Cho 2007, 2005; Cho and Park 2003) which relate directly to the subject of this research as well as several other studies on perceived risks (Kim et al. 2008, Korgaonkar 1982, Lim 2003) in marketing and electronic commerce areas. The concept of *customer needs of geographical accessibility* is ‘the need for accessibility by customers to a firm's physical service network such as headquarters office, distribution center, or customer support center that enables customers to have face-to-face contact with service providers when they need it, defined in previous studies (Cho 2007). In the research model proposed in this study, the *customer needs of geographical accessibility* is adopted as a dependent factor. The three independent factors are *unease of delivery*, *complexity of services*, and *trust and reliability*, and a mediating factor is *perceived risks of distant orders*.

### 2.1. Customer needs of geographical accessibility in electronic commerce

In spite of the fact that the effect of geographical accessibility has been reduced with the application of electronic commerce, it should be still regarded as a critical variable affecting operations management and marketing in electronic commerce (Boyer et al. 2002, Cho 2007, 2005; Cho and Park 2003, Hallowell 2000, Mols 1999). Many transactions in electronic commerce still require face-to-face interactions between service provider and customer and the great majority of transactions are still conducted offline (Brynjolfsson et al., 2009). In addition, customers can perceive risks in transactions when contact phone numbers or addresses for physical offices or warehouses are not provided (Lim 2003). Therefore, offline transaction can sometimes reduce the customers' perceived risks because they can walk into the seller's office whenever they need to (Kim et al. 2008). However, the needs for geographical accessibility by customers can be varied by the influences of diverse factors such as characteristics of a firm's market strategy (e.g. advertising, strategic alliance, after-service system), characteristics of product or service processes (e.g. price, volume, fragility), and trust and reliability (e.g. firm reputation, service reliability, product warranty of services) (Cho, 2007, 2005, Cho and Park 2003). In particular, operations concerned with delivery of tangible services (Lovelock 1983), customer support and logistics (Hallowell 2000) are directly related to *customer needs of geographical accessibility*.

### 2.2. Unease of delivery

The factor of *unease of delivery* is comprised of several dimensions such as delivery cost, delivery time, and maintenance of quality in delivery processes. Again, these dimensions are closely related to certain product characteristics such as (1) product tangibility including product volume, weight, fragility, damageability, and perishable features, (2) delivery cost, and (3) convenience of delivery

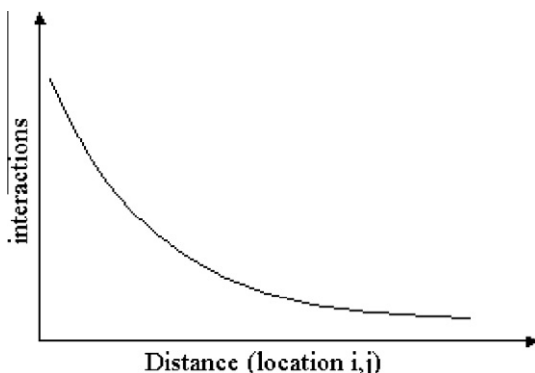


Fig. 1. General distance decay model.

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