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Abdullah Basiouni
Industrial Management Technology Department, Yanbu Industrial College, Yanbu Industrial City, Saudi Arabia., abasiouni1@yahoo.com

Walid Bahamdan
Accounting and MIS, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia., bahamdan96@yahoo.com

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Innovation in Online Selling Business Models: A Structural Equation Modeling-Based Multigroup Analysis

Abdullah Basiouni  
Industrial Management Technology Department,  
Yanbu Industrial College, Royal Commission,  
Yanbu Industrial City, Saudi Arabia  
abasiounil@yahoo.com

Walid Bahamdan  
Department of Accounting and MIS, College of Industrial Management, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia  
wbahamda@uwaterloo.ca

ABSTRACT

This paper examines the impact of net-enablement capability on the innovation in business model for online selling utilizing the Net-enabled Business Innovation Cycle (NEBIC) theoretical framework. Based on a sample of 296 online sellers across different Canadian sectors, the paper empirically tests for the invariant in the relationship between net-enablement capability and the innovation in online selling business model across three different groups of respondents. These groups were selected based on sector’s level of online selling, prior online buying experience, and firm size. The framework utilized structural equation modeling (SEM) and tested using AMOS 18.0. The results of the analyses demonstrate relatively a reasonable fit of the model to the data collected ($\chi^2=4757.62$, $\chi^2$/DF=2.23, RMSEA=0.07, CFI=0.87, TLI=0.87). Further, respondents grouped based on their prior online buying experience and firm size show variability in respect to the relationship between net-enablement capability and business model innovation for online selling.

Keywords  
NEBIC, multigroup analysis, dynamic capability, e-business, online selling, net-enablement.

INTRODUCTION

Online selling transaction is rising rapidly and contributed to 2.9% of the worldwide total GDP ($1,672 billion of value) in 2009. In Canada, online selling contributed to about 2.7% of the national GDP in 2009. In dollar value, this value ranged from about $5 billion in 2000 to over $60 billion by 2009 (Statistics Canada, 2007; du Rausas et al., 2011). This shows the increasing importance of the use of the Internet to conduct online commerce in general and within the specific Canadian context.

Studies have pointed to the strategic and operational benefits of advances in technologies related to networks, e-business, and the Internet. These benefits include integrating internal business units, connecting firms with their external business environments (e.g., Slater, 2000; Sawhney and Zablin, 2001; Boritz and No, 2005), eliminating traditional business location barriers (Kobrin, 2001), and improving a firm’s efficiency (Fletcher et al., 2004). It should be cautioned that a firm’s competencies and resources should form the basis by which the firm decides on the level of technology adoption that can generate competitive advantages and performance improvement for the firm without overextending its resources (Zhang and Lado, 2001). This kind of decision-making increases the possibility of successful adoption and the potential economic benefits of adoption (e.g., increased sales, minimized costs, increased customer satisfaction).

Further, there is a call in the literature to investigate the nature of online selling and the challenges faced by online sellers (e.g., Stockdale and Standing, 2002; Rask and Kragh, 2004). In addition, researchers argued that when a new technology is implemented, business model innovations take place (e.g., Schon, 1967; Teece et al., 1997; Suchman and Bishop, 2000; King et al., 2002; Ciborra, 2009). Other researchers argued that better developed internal organizational capability of net-enablement is associated with better developed business model innovation, in the process of general IT adoption (e.g., Wheeler, 2002; Basiouni and McNaughton, 2011). Indeed, very few studies tried to uncover the specific nature of online selling adoption and its impact on business model innovation (e.g., Basiouni and McNaughton, 2011).
Wheeler (2002) introduced a theoretical framework based on both dynamic capability and absorptive capacity theories to articulate the relationship between technology identification and the creation of customer value by utilizing net-enablement capability. The theory, called Net-enabled Business Innovation Cycle (NEBIC), describes the process of how to maintain business development and growth by innovative use of technologies. While many researchers commented on the face validity of the theory (e.g., Zahra and George, 2002; Saeed et al., 2005; Yoo et al., 2010), very few studies empirically tested it (e.g., Williams, 2004) and validated its relationship with business model innovations (e.g., Basiouni and McNaughton, 2011).

This study focuses on the relationship between net-enablement capability and the innovation in business models for online selling. Specifically, does such relationship remain invariant while manipulating groups of respondents based on some internal organizational and external business factors? To answer this question, this paper proceeds by discussing the research model and the used theoretical frameworks of NEBIC. This is followed by a brief description of each construct of the model and description of the possible effect of the sector’s level of online selling, prior online buying experience, and firm size and the associated hypotheses. This is followed by testing the research model. Then multigroup analyses will be conducted to test how different groups of respondents behave on the concerned relationship.

MODEL AND HYPOTHESES

This study posits that the online selling implementation, based on net-enablement capability, is associated with the innovation in business model to accommodate the new requirements of adoption online selling. Within the context of NEBIC, net-enablement capability can “reduce barriers of time and distance, substitute information for physical process, and engage in innovation that aligns the firm to its competitive environment” (Wheeler, 2002, p. 126). Wheeler’s (2002) NEBIC theory associates net-enablement with creating customer value and postulates a feedback loop that enhances future technology choices. Specifically, the theory posits that the successful implementation of technology innovation to maintain business growth is associated with better-developed net-enablement capability. Wheeler (2005, p. 6) defines NEBIC as “a view of requisite capabilities and their interactions to proactively realize business value in an age of unending IT change.” That is, firms use and develop their net-enablement capability to enhance the process of identifying, selecting, and implementing new IT and consequently create customer value to maintain business growth and competitiveness.

Based on the NEBIC theory, the model of this study consists of four constructs to assess the net-enablement capability and its association with business model innovation for online selling. The constructs that describe the net-enablement capability are: 1) choosing enabling technologies (CET), 2) matching proposed technologies with economic opportunities (MEO), and 3) executing online selling as business innovation for growth (EOSBIG). The research ultimate dependent variable is business model innovation needed to accommodate the new requirements of online selling implementation (BMIOS).

Choosing Enabling Technology (CET)

CET is the first construct in this research model. It describes the activity of choosing one or more enabling information technologies for possible adoption. The inputs to the construct of CET are relevant developments in information technology, the broad cultural attitudes toward technology adoption, and other relevant feedback retained from previous cycles of technology adoption. A strong CET construct produces a timely and well-examined flow of enabling technology choices and delivers them to the corresponding MEO construct. The CET construct also involves efficient communication with its proceeding MEO construct. Further, the responsibility of managing the CET construct falls to either the information technology department or the line-of-business unit (Wheeler, 2002).

Matching Proposed Technologies with Economic Opportunities (MEO)

This construct represents the firm’s ability to match the proposed technology benefits with the possible economic opportunities that could be created for the firm by selecting the proposed technology. Different information technologies can create benefits and strategic advantages for the firm and maybe even for the whole sector. However, these benefits should be matched with the economic opportunities for the firm itself. Not all technology benefits are suitable for all firms, and some new technologies require substantial changes in the firm’s resources, which require careful study prior to a decision to invest time and resources in those changes. The inputs to this construct are those technologies that are delivered from the CET construct. Current business strategy assessment and environmental scanning are conducted to identify shifting customer or business trends, which also contribute to this construct. Strong MEO produces strategic options and planned business changes that support the implementation of the new technology. Furthermore, this construct involves efficient communication with both the preceding CET construct and the following EITBIG construct (Wheeler, 2002).

H1: The CET construct is positively correlated with the MEO construct.
Executing Online Selling as Business Innovation for Growth (EOSBIG)

The execution of a new technology as business innovation for growth represents the firm’s ability to reconfigure its products, services, sales channels, supply chain, and so on. The EITBIG construct inputs are the proposal for a specific technology as a technology selected for further implementation and a commitment to ensuring organizationally relevant changes and innovations. A strong EITBIG construct produces reconfigurations related to the proposed technology adoption. Furthermore, the EITBIG construct requires efficient communication with its preceding MEO construct (Wheeler, 2002; Alojairi and Safayeni, 2012).

H2: The MEO construct is positively correlated with the EOSBIG construct.

Business Model Innovation for Online Selling (BMIOS)

This construct describes the reconfigurations that online sellers do in their business models to accommodate online selling. That is, it describes the changes a firm makes in its way of doing business for the purpose of accommodating and utilizing its adoption of online selling. These targeted innovations can take place in many aspects of the firm, such as the firm’s products, services, sales channels, and supply chain. It can also take many forms, such as technological, procedural, and managerial innovations (Basiouni and McNaughton, 2011).

H3: The EOSBIG construct is positively correlated with the BMIOS construct.

Many researchers recommended conducting multigroup analysis when the researcher anticipates that different groups may behave differently against the tested model and affect the relationships between the constructs of the model and other specifications (Bagozzi and Yi, 1988; Koufteros and Marcoulides, 2006; Zhao and Cavusgil, 2006; Hair et al., 2010). In addition, Koufteros and Marcoulides (2006) criticized many studies, which use SEM tools, as being reluctant to examine the effect of different groups of respondents on their studied models. According to Koufteros and Marcoulides (2006) the investigated models were indeed affected while using different groups of respondents and consequently changed the reported results. In response, this research assesses the effect of different groups with different sector’s level of online selling, prior online buying experience, and firm size against the relationship between net-enablement capability and business model innovation for online selling.

Level of Online Selling

This research sampled responses from Canadian online sellers across all sectors. Thus there was cross-sectional data from sectors with above- and below-average rates of online selling adoption. Indeed, data collected by Statistics Canada showed a large gap between different sectors in online selling adoption rates, varying from about 0% to 30% (Statistics Canada, 2007). For this research, the average adoption rate (9%) was used as the threshold to distinguish between sectors with below- and above-average rates of online selling adoption. Further, researchers differentiated between sectors with higher IT adoption rates from sectors with lower IT adoption rates based on pressure from the business environment. Generally speaking, while firms in sectors with higher IT adoption rates may be pushed by their business environment, firms in sectors characterized as challenging for IT adoption were expected to initiate a move toward IT adoption (e.g., Martin, 1994; Kioses et al., 2006). Other researchers characterize higher online selling adoption sectors as having products or services suitable for online selling, while lower online selling adoption sectors have products or services not as appropriate for online selling (e.g., Bakker, 2000; OECD, 2001). Thus, the key difference between these sectors might be the source that can influence the decision to sell online and consequently innovates related business models.

From a theoretical perspective, this study assesses the internal capabilities of the firms. The assumption is that the extent to which firms innovate their business models to utilize the adoption of online selling is affected by the sector’s level of online selling adoption rate.

H4: Different levels of online selling among sectors affects the relationship between the EOSBIG and BMIOS constructs.

Past Experience of Online Buying

Another expected influencing variable is prior online buying experience of respondents which is based on absorptive capacity theory originally developed by Cohen and Levinthal (1990). Some relevant learning experience may be developed through prior experiences with online buying (i.e., absorptive capacity). Notably, the Statistics Canada (2007) data shows that online buying is much more common than online selling. One rationale is that firms that purchase online have a greater absorptive
capacity when considering any move into online selling. The effect of the relationship between online selling and buying was assessed and addressed, as it seems uninvestigated in the literature. Based on the reported statistical data, the correlation between rate of online selling and buying for all Canadian private sectors was calculated to be 65% (i.e., moderate effect of online buying on online selling), and the Variance Explained (VE) was 42%, as explained by the adoption of online buying. From a theoretical perspective, the study assesses the internal capabilities of online selling firms. The extent to which firms innovate their business models would hypothesize as being affected by past online buying experience of the firms.

**H5: Prior online buying experience affects the relationship between the EOSBIG and BMIOS constructs.**

**Size of the Firm**

Because this research used the Canadian Company Capabilities (CCC) directory for sampling, the concern is that the sample could be biased toward smaller firms and those with better IT use as warned by many researchers (e.g., Sheppard, 2010; Tucker, 2011). Researchers argue that smaller firms are different than larger ones. According to Martin (1994) and Golovko and Valentini (2011), smaller firms are more likely to be innovative. Fischer and Reuber (2011) argued that since the Canadian domestic market is relatively small, smaller firms find it more promising to join the online market to maintain growth. From a theoretical perspective, this study assesses the internal capabilities of online sellers. The assumption is that the extent to which firms innovate their business models to utilize the adoption of online selling is affected by firm size.

**H6: Firm size (i.e., micro, small, medium, and large) affects the relationship between the EOSBIG and BMIOS constructs.**

Figure 1. Research conceptual model for business model innovations of online selling.

* Dash line indicates the multigroup effect.

Figure 1 illustrates the conceptual model of this study. The figure shows the interaction among the model’s components as well as the possible effect of different groups of respondents on the relationship between net-enablement capability and the innovation in business models for online selling.

**METHODS AND RESULTS**

This study adapted the NEBIC scales developed by Basiouni and McNaughton (2011), then an online survey was developed and distributed to firms in all Canadian sectors. The CCC directory was used to identify potential participants. We have collected 296 valid responses. Cronbach’s alpha test assessed the model reliability. The resulted values were greater than 0.85, which indicates a high level of accuracy for the scale items in explaining the theoretical constructs. From a validity
perspective, all constructs had average variance explained (AVE) greater than 70% and all items' loadings were of at least 0.7. Another measurement for validity is to compare corrected item-total correlation (CITC) values. All values scored way above 0.4, indicating that the items indeed show validity as suggested by many researchers (e.g., Guilford and Fruchter, 1973; Zimmaro, 2003; Diekhoff, 1996; Hair et al., 2010).

To test hypotheses 1, 2, and 3, SEM analysis was conducted using AMOS 18.0. All paths were significant and strong. CET positively influences MEO, MEO positively influences EOSBIG, and EOSBIG positively influences BMIOS as reported in Table 1. Additionally, goodness-of-fit analysis (GOF) was also conducted to test the fitness between the research model and the collected data. The $\chi^2$ is 4757.62 with 2,133 degrees of freedom ($p$-value < 0.05); the normal chi-square is 2.23. The model CFI is 0.87 with a RMSEA of 0.07. These diagnostics suggest that the model provides a good overall fit.

<table>
<thead>
<tr>
<th>Paths/Hypotheses</th>
<th>Standard Estimate</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEO $\leftarrow$ CET (H1)</td>
<td>0.91</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>EOSBIG $\leftarrow$ MEO (H2)</td>
<td>0.88</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BMIOS $\leftarrow$ EOSBIG (H3)</td>
<td>0.33</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 1. Results of path coefficient analysis.

Hypotheses 4, 5, and 6 were tested using multigroup analysis following the procedures suggested by Koufteros and Marcoulides, 2006. To do so, the original online selling sample of $n = 296$ was divided into six groups (two groups per analysis) as follows:

1. Sector level of online selling adoption (online sellers in sectors with below the average rate of adoption: $n = 163$; online sellers in sectors with above the average rate of adoption: $n = 133$)
2. Online buying experience (online buyers firms: $n = 246$; non-online buyers firms: $n = 50$)
3. Firm size (micro firms: $n = 214$; SME and large firms: $n = 82$)

Results of the multigroup analysis show that both groups of respondents with past experience of online buying and micro firm size were significantly influencing the relationship between net-enablement capability and business model innovation for online selling. However, the groups of respondents based on the sector’s level of online selling were evident to have no significant influencing effect on the concerned relationship as presented in Table 2.

DISCUSSIONS AND CONCLUSIONS

The aim of this study is to assess the effect of employing different groups of respondents on the relationship between net-enablement capability and the innovation in business models for Canadian online sellers. The findings of this study confirm the previous findings of Wheeler (2002), Williams (2004), and Basiouni and McNaughton (2011) regarding NEBIC. The results show that the research model had reasonable goodness-of-fit analysis (GOF) with the collected data. In addition, all the research hypotheses related to NEBIC were found to be valid and significant.

From multigroup analysis perspective, the results show that online sellers with no previous online buying experience are better in representing the relationship between net-enablement capability with business models innovation compared with those with prior online buying experience. This finding seems interesting as the experience in online buying, on its face value, may help firms in their adoption of online selling. This could be viewed as that when online sellers with no online buying experience decide to sell online, they do not need online buying experience as a prerequisite to sell online. Further, when it was proposed that the concerned relationship would be affected by online sellers with online buying experience, it was assumed that this relationship was linear. That is, prior online buying experience, based on the absorptive capacity perspective, would positively affect the decision to sell online. However, it might be a better explanation to consider that online sellers with no prior online buying experience as if their decision was nonlinearly executed and innovatively decided.

Further, Carr (2003) argued that dealing with and adopting technologies are not always simple experiences. Already-implemented technologies could be a source of rigidity, limitation, and possible future threats for the firms. In the same analogy, prior online buying experience might create a psychological barrier that limits the thinking of decision-makers about
what they could sell online, to those items that are typically available in the online market. However, possessing no prior experience in online buying could be an advantage for other decision-makers to think freely and innovatively without limitations about the typical examples of what is already sold online.

### Groups of Online Sellers

<table>
<thead>
<tr>
<th>Sector Online Selling Level</th>
<th>Coefficient</th>
<th>$\chi^2$ Diff.</th>
<th>DF</th>
<th>p-value</th>
<th>Hypotheses</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online sellers in sectors with below the average rate of adoption</td>
<td>0.31</td>
<td>31.64 (n.s.)</td>
<td>33</td>
<td>0.54</td>
<td>H4</td>
<td>Reject</td>
</tr>
<tr>
<td>Online sellers in sectors with above the average rate of adoption</td>
<td>0.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Past Experience of Online Buying</th>
<th>Coefficient</th>
<th>$\chi^2$ Diff.</th>
<th>DF</th>
<th>p-value</th>
<th>Hypotheses</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online buyers firms</td>
<td>0.27</td>
<td>24.698 (***</td>
<td>33</td>
<td>0.09</td>
<td>H5</td>
<td>Accept</td>
</tr>
<tr>
<td>Non-online buyers firms</td>
<td>0.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Firm size</th>
<th>Coefficient</th>
<th>$\chi^2$ Diff.</th>
<th>DF</th>
<th>p-value</th>
<th>Hypotheses</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro firms</td>
<td>0.32</td>
<td>63.017 (****</td>
<td>33</td>
<td>0.00</td>
<td>H6</td>
<td>Accept</td>
</tr>
<tr>
<td>SME and large firms</td>
<td>0.29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Results of multigroup analyses.

n.s. = not significant at $p > 0.05$.

* The values listed represent the results of the research model while using each associated dataset (i.e., based on sectors with below vs. above the average rate of online selling adoption), and all paths coefficients are significant at $p < 0.01$.

** The values listed represent the results of the comparisons between both the unconstrained and constrained models.

*** Values are significant at $p < 0.10$.

**** Values are significant at $p < 0.05$.

Also, groups of respondents classified based on size were found to significantly influence the concerned relationship. It was evident that micro firms are better representing the relationship between net-enablement capability and business models innovation compared with larger firms. This result is consistent with the recent findings published by the Conference Board of Canada, which reported that in the limited size of the Canadian market, smaller firms are more eager to search for more markets and are more innovative in their marketing strategies than are larger firms. However, their findings also show that one of the major barriers to smaller firms selling online is that they do not know how to sell online (Fischer and Reuber, 2011). Consequently, smaller firms underwent greater development of their internal organizational capability and absorptive capacity in order to adopt online selling than did the larger firms.

The effect of sector’s level of online selling adoption rates, however, found to be not statistically affecting the concerned relationship. Thus firms that successfully reconfigured their business models to accommodate online selling developed significant internal net-enablement capability, regardless of their related sector levels of online selling adoption. For example, firms in sectors with lower online selling adoption rates may have undergone substantial innovations in their internal business processes and products/services. Other firms may have undergone greater efforts to change their bureaucratic business environment to utilize the opportunities of the adopted tools of online selling.

As with other studies, this research has some limitations. First, the collected data represents Canadian industrial sectors only. This would limit the generalizability of the findings. Thus researchers are encouraged to test the research model in other countries. Second, one key informant from each firm answered the survey of the current study. This may raise an issue of common method bias. Future research may consider dividing the survey into two parts in which one represents the dependent variable and the other represents the independent variables.
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