A Multi-Group Analysis of Innovation in Online Business Models

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ABSTRACT
A sample of 295 firms in Canada across various sectors was used for testing the relationship between Net-enabled Business Innovation Cycle (NEBIC) and innovation in online business models. These firms were categorised as sectors with different levels of online selling adoption, online buying orientations and firms with different sizes. Quantitative analysis and SEM results revealed a reasonable fit between data collected and the model used: chi2 (4757.63), chi2 / DF (2.24), RMSEA (0.08), CFI (0.86), and TLI (0.86). The multi-group analysis showed statistically significant evidence that online seller’s differentiated firms with smaller sizes and firms with no prior online buying to demonstrate the relationship between Net-enablement capability and the choice to sell online. However, firms from different sectors with different online selling adoption rates showed statistically insignificant differences. Therefore, when considering the adoption of new technologies such as online selling, smaller firms with no prior online buying may produce better results in their business models regardless of their associated business sectors’ level of online selling adoption rates.

Keywords: Absorptive capacity, dynamic capability, e-commerce, Net-enabled Business Innovation Cycle, multi-group analysis

INTRODUCTION
Studies (e.g., Giri & Wellang, 2016; Lee, Foo, Leong, & Ooi, 2016; Wagner, Schramm-Klein, & Steinmann, 2017) have explored innovation in e-commerce business models and commented on their strategic and operational effectiveness, especially in integrating internal business functions and connecting firms together. According to Oppong-Tawiah and Yolande (2016); Rufaidah (2016); Teece, Pisano and Shuen (1997) introducing new technologies (e.g., internet and e-commerce technologies) push
the firms to remodel their business to cope with their suppliers and clients.

Other researchers focused on the special nature of online selling and the associated challenges faced by companies selling online (Wagner et al., 2017). Further, Basiouni and McNaughton (2011); Bilgihan and Bujisic (2014); Ehrenhard, Wijnhoven, van den Broek and Stagno (2017); Wheeler (2002); Williams (2004) found that there is a positive relationship between the level of development in internal organisational capability and the development in firms’ business model by adopting Information Technology. However, other scholars (e.g., Abdurachman & Sriwardiningsih, 2016; Bagozzi & Yi, 1988; Hair, Anderson, Babin, & Black, 2010; Hox, De Leeuw, & Klausch, 2017; Koufteros & Marcoulides, 2006) warned researchers that different groups of responders may behave differently while testing the research model. They recommended conducting multi-group analysis to observe how different groups of responders (i.e., sectors with different levels of online selling adoption, sectors with different online buying orientations, and firms with different sizes) behave while testing the research model.

LITERATURE REVIEW

This study uses the Net-enabled Business Innovation Cycle (NEBIC) model developed by Wheeler (2002), which shows how continued adoption and development in IT can help firms maintain business improvement and their growth. Derived from the well-known theories of dynamic capability and absorptive capacity (e.g., Rufaidah, 2016; Saeed, Grover, & Hwang, 2005; Yoo, Henfridsson, & Lyytinen, 2010; Zahra & George, 2002).

There has been an ongoing debate on Wheeler (2002) theory. For more than a decade, a number of researchers have cited, operationalised, and used the NEBIC model in their articles, e.g., Almansour, Basiouni, Alojairi and Bahamdan (2013); Basiouni (2012); Burton-Jones, McLean and Monod (2015); Chakravarty, Grewal and Sambamurthy (2013); Ehrenhard et al. (2017); Hernandez-Munoz, Torane, Amini and Vivekanandan-Dhukaram (2015); Tallon, Coltman, Queiroz and Sharma

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(2016); Williams (2004) and this study contributes to the debate by conducting a multi-group analysis on Canadian online sellers.

Specifically, this study investigates the relationship between Net-enablement capability and business model innovations for online selling. It examines if such a relationship remains unchanged, even if responders are grouped differently based on various internal and external business factors. After describing each factor of the model and any possible result of the firms’ different sizes, different online buying orientations, and sector’s level of online selling adoption, it tests the model. Overall, it assesses how different groups behave while testing the association between Net-enablement capability and the business models’ innovation in online selling in Canada.

**Research Model**

It is assumed that online selling is linked with the innovation of a business model. Net-enablement capability helps resolve problems related to time and distance, substitutes information with physical process, and integrates innovation that allows a firm to be on more equal footing with its competitors (Wheeler, 2002). The NEBIC theory engages Net-enablement with customer value creation; it assumes a feedback loop retained from each business cycle for improving the following cycle of technology selection. Further, successful implementation of technology innovation is subject to better-developed Net-enablement capability. Sustained improvement in business can be achieved by developing Net-enablement capability that is based on selecting and implementing new information technologies.

The study is based on the NEBIC model comprising the following four constructs:

1) **Choosing enabling technologies (CET)** involves appropriate developments in IT, a broad cultural approach toward technology implementation, and feedback from preceding cycles of technology implementation. The IT department or the business function unit head manages this construct.

2) **Matching anticipated technologies with economic opportunities (MEO)** allows the company to enjoy technology and commercial benefits that could be created for the company by selecting the planned technology. Before a company invests time and resources in making any essential changes, a cautious inspection is required.

3) **Conducting online selling as business innovation for growth (COSBIG)**. The COSBIG construct inputs indicate a particular technology selected for further development to ensure appropriate modification. A strong COSBIG construct contributes reconfigurations pertaining to the proposed technology adoption (Alojairi & Safayeni, 2012; Wheeler, 2002). This construct shows reconfigurations that online sellers
employ in their business models to conduct online selling.

4) The key dependent variable is business model innovation necessary to accommodate the new accomplishments of online selling implementation (BMIOS).

In testing the relationship between the research constructs, this study utilised Structural Equation Modeling (SEM), which is a quantitative technique for testing hypotheses about possible relevance that might exist within a set of variables (Hoyle, 2012). These variables may be latent or observed. The SEM is based on covariance structural modelling, by which researchers can decrease many variables into a few ones. In such, SEM allows researchers to examine theoretical models that are based on several variables. Agan et al. (2015); Hoyle (2012), and Little (2013) agreed that SEM permits weaker assumptions than what is usually the case with conventional statistical models.

Green and Thompson (2012) reported that SEM can be used for modelling basics such as variances, means, t-tests, and ANOVAs. Researchers can also rely on SEM for group comparisons, categorical variables, latent class models, multilevel models, and item response models (Edelsbrunner et al., 2015; Hox et al., 2017; Televantou, Marsh, Kyriakides, Nagengast, Fletcher, & Malmberg, 2015; van de Schoot, Lugtig, & Hox, 2012). Several authors employ the SEM method for panel data. For example, Barker, Rancourt and Jelalian (2014); Coman et al. (2013) used repeated-measures t-tests and ANOVAs. Others, such as Little (2013); McArdle and Nesselroade (2014), applied cross-lagged models, change-score models, and growth-curve models in their research.

According to Statistics Canada (2013) report titled Digital Technology and Internet Use, Canadian enterprises sold more than C$136 billion worth of online goods and services in 2013. Wholesale trade, manufacturing and retail trade accounted for the majority (61%) of the value of e-commerce sales. Further, 13% of Canadian enterprises sold goods or services over the Internet in 2013, and they reported that a quarter (24%) of their total sales came from online transactions. Interestingly, 64% of the overall sales was attributable to other businesses. Sectors characterised as having high e-commerce adoption rates such as wholesale trade and retail trade reported that only 22% and 18% of the firms conducted online selling respectively, while just about (47%) of Canadian firms purchased goods or services online.

This study used the threshold value of 9% to divide Canadian sectors into two groups, namely high and low online selling adoption sectors. This threshold was derived from the reported statistics; Canadian sectors vary when it comes to the adoption of online selling, from 0% to 30% (Statistics Canada, 2007; 2013). The pressures from the business environment was also considered in which firms with higher IT adoption rates were more likely to
sell online compared with firms in sectors characterised as having lower IT adoption rates. However, companies with lower IT adoption rates may initiate a move towards IT both innovatively and entrepreneurially (Kioses, Pramatari, & Doukidis, 2006). Higher online selling adoption sectors deal with products or services that are suitable for online selling, while its vice versa for lower online selling adoption sectors (OECD, 2012, 2013). This is a crucial difference that may show different behaviours among different groups of responders, which consequently may produce different results when applying the research model.

As this research examined internal capabilities, it was assumed that the extent to which firms innovate their business models was influenced by the sector’s level of online selling adoption rate. It is argued that online selling may be influenced by the past knowledge of the firms of buying online. This argument is in-line with the absorptive capacity theory, originally developed by Cohen and Levinthal (1990), to judge how learning experience may be developed through prior experiences. According to Statistics Canada (2007), online buying is more common compared with online selling. Many researchers agreed that prior experience exert a positive impact on the businesses future development and success (e.g., Giri & Wellang, 2016; Pebrianti, 2016). Hence, this research took a further step by calculating the correlation coefficient between the rate of online selling and online buying for all Canadian sectors and found it equalled to 65%, and the Variance Explained (VE) equalled to 42%. These results and arguments validated the need to further divide the responders according to their prior experience in online buying (i.e., online buyers vs. non-online buyers).

Firm size was also identified in this study to conduct the multi-group analysis. This research used the Canadian Company Capabilities (CCC) directory to recruit responders. Some researchers have already criticised that such directories may favour firms with better IT capabilities and smaller sizes against all others (e.g., Sheppard, 2010; Tucker, 2011). In fact, smaller firms are more likely to be innovative and technology oriented (Golovko & Valentini, 2011). According to Fischer and Reuber (2011), in Canada, smaller firms are more eager to sell online to maintain economic growth, as the Canadian market is relatively small. Thus, this study argues that firm size may affect the decision to sell online and innovate a company’s business model accordingly.

The framework of this study is shown in Figure 1. It shows the interaction among the study’s components and the possible impact of variations exerted on different groups of responders.
MATERIALS AND METHODS

This study assumed that technology adopters are more likely to have better-developed Net-enablement capabilities than non-adopters. The study authenticated both the theoretical aspect and the empirical relationships within the Net-enablement constructs. This framework rested on the four constructs that reflected a firm’s ability to adopt an innovation and reconfigure its business model in order to exploit the benefits of the adopted innovation.

Data was collected from 295 companies listed in the CCC directory using an online, seven-point Likert scale survey originally developed by Akgun et al. (2006); Basiouni (2012); Chesbrough (2007); Williams (2004) to represent the Net-enablement capability and the associated innovation in business models for online selling. According to the Cronbach’s alpha test, all values were greater than 0.90 – a high level of accuracy of the theoretical constructs explained by the scale items. Furthermore, all constructs have average variance explained (AVE) greater than 77% and all item loadings were at least 0.8. All corrected item-total correlation (CITC) values were above 0.4 – a high level of validity of the theoretical constructs explained by the scale items.

After conducting SEM analysis in AMOS 18, all paths were found to significant and positively correlated (Table 1). The GOF analysis was also conducted and revealed chi2 (4757.63), DF (2,133), p-value < 0.05, normal chi-square (2.24), the model CFI (0.86), and RMSEA (0.08). Based on the reported results, the study concluded that the model showed a good overall fit.

<table>
<thead>
<tr>
<th>Path</th>
<th>SE</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEO → CET</td>
<td>0.91</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>COSBIG → MEO</td>
<td>0.88</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BMIOS → COSBIG</td>
<td>0.33</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Figure 1. Research framework for BMIOS. Dashed lines indicate the multi-group effect.
The original online selling sample was divided into six groups (two groups per analysis). The first one dealt with the level of online selling adoption rates across sectors, showing sectors with high adoption rates (n=163) and sectors with low adoption rates (n=133). Second, the sample was divided into firms with online buying orientation (n=246) and firms with no prior online buying orientation (n=50). An analysis was also conducted on firms based on their sizes, namely micro companies (n=214) and SMEs and large companies (n=82).

The empirical research shows that firms grouped based on online buying orientation and firms size have significant impact on the relationship between Net-enablement capability and business model innovation for online selling. However, sector level of online selling adoption rates did not change the research model results across different levels of adoption rates. Table 2 provides an overview of our research results.

Table 2
Results of the path coefficient analysis

<table>
<thead>
<tr>
<th>The study's Groups of Responders</th>
<th>Coef. (*)</th>
<th>chi² Diff. (**)</th>
<th>DF Diff. (**)</th>
<th>p-value (**)</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector level online selling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firms in sectors with low level of online selling adoption rates</td>
<td>0.31</td>
<td>31.64</td>
<td>33</td>
<td>0.54</td>
<td>Reject</td>
</tr>
<tr>
<td>Firms in sectors with high level of online selling adoption rates</td>
<td>0.37</td>
<td>(n.s.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online buying orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online buyers</td>
<td>0.27</td>
<td>24.698</td>
<td>33</td>
<td>0.09</td>
<td>Accept</td>
</tr>
<tr>
<td>Non-online buyers</td>
<td>0.36</td>
<td>(****)</td>
<td></td>
<td></td>
<td>Accept</td>
</tr>
<tr>
<td>Firm size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micro</td>
<td>0.32</td>
<td>63.017</td>
<td>33</td>
<td>0.00</td>
<td>Accept</td>
</tr>
<tr>
<td>SME and large</td>
<td>0.29</td>
<td>(****)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 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

RESULTS AND DISCUSSIONS

Responders with no online buying orientation are statistically better than those without it. Interestingly, responders with no online buying experience are better at adopting online selling. This is in contradiction with the absorptive capacity theory, as the prior impact of online buying results in a negative impact on the decision to sell online. While this finding seems interesting, Carr (2003) claimed that prior IT experience may become a source of future threat and rigidity. In fact, many decision makers may become
hesitant to implement new technologies because of some psychological issues that may limit them from gaining the significant benefits associated with the rejected new technologies. This finding also suggests that the relationship between online selling and online buying may not be as linear as explained in the literature. Consequently, the decision to sell online may be nonlinearly and entrepreneurially executed.

It is found that groups classified according to size showed a significant relationship between Net-enablement capability and business model innovation. Micro companies showed a better relationship than larger firms. On one hand, this result is consistent with the findings published by the Conference Board of Canada, specifically that smaller companies are more likely to enter other markets ahead of the limited Canadian market, and they are more innovative in their marketing strategy than their larger counterparts (Fischer & Reuber, 2011). On the other hand, smaller companies may be deterred from selling online because they do not know how to sell online. Micro companies may have to develop better internal organisational capability and accepting capacity in order to sell online compared with larger firms.

CONCLUSION

Finally, this research found that different levels of online selling adoption rate do not significantly influence the relationship between Net-enablement capability and the decision to sell online. This may mean that online sellers in sectors with low adoption rates exhibited major organisational and products/services innovations while others in sectors with high adoption rates fought for changing their business bureaucracy to exploit the opportunities of adopting new technologies.

All three levels of analysis (sellers based on prior online buying experience, sellers based on company size, and sellers classified according to their sectors) only concerned Canadian firms. This limits the geographic scope of the present findings. Future research could look at other countries. Also, the fact that there is only one key responder from each company may lead to common method bias which can be tackled in future studies.

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REFERENCES


