

Impact of digital embeddedness on organizational purchase behaviors

Haris Krijestorac

PhD Student, Department of Information, Risk and Operations Management (IROM)

University of Texas at Austin, McCombs School of Business

Haris.Krijestorac@utexas.edu

Rajiv Garg

Assistant Professor, Department of Information, Risk and Operations Management (IROM)

University of Texas at Austin, McCombs School of Business

Rajiv.Garg@mccombs.utexas.edu

Abstract

Our study examines the effect of digital embeddedness on business purchase behavior using data from an original, IRB-approved survey of purchasing managers. We find that more digitally embedded individuals are less brand sensitive, less susceptible to peer influence, more risk tolerant, and more demanding of innovation from products they buy.

Keywords

purchase decisions, business-to-business, new economy

INTRODUCTION

Transactions between businesses are notoriously complex. Relative to business-to-consumer (B2C) purchases, business-to-business (B2B) transactions involve smaller target markets, high-value transactions and long sales cycles (Brennan et al., 2007). In addition, the stakeholders of business transactions face unique risks beyond loss of investment, such as damage to careers.

Within such an environment, it is often assumed that B2B marketing requires a fundamentally different approach (Kotler and Pfoertsch 2006). Specifically, B2B and/or risky purchasing environments are seen as characterized by placing high importance on brand (Kotler and Pfoertsch 2007; Leek and Christodoulides 2012; Persson 2010), relationship with vendor (Rauyruen and Miller, 2005), interpersonal influence (Henthorne, LaTour & Williams 1993), and risk-mitigation (Choffray and Johnson 1979; Puto, Patton & King 1985).

In spite of the differences between business and consumer purchasing, prominent scholars and practitioners alike are citing a convergence of B2B and B2C principles (Aberdeen Group, 2015; Wind, 2006). Within these arguments, digital technologies and the Internet are often credited as spurring recent evolutions in purchasing behavior in both business and consumer realms. For example, online reviews offer consumers more detailed information on products that can make them rely less on proxies for quality such as brand (e.g., ‘The IBM effect’) or country of origin (e.g., ‘Swiss watch’). (Simonsen and Rosen 2014).

Along with studies on the impact of digital technologies on purchasing behaviors, there is much talk about a ‘Digital Divide’, suggesting that different populations are influenced differently by such technologies. A new generation referred to as ‘Millenials’, ‘Digital Natives’ or ‘Generation X’ is the epitome of this new breed of consumer, and there have been many claims as to how they are changing the market. Such discussions have been present in B2B research as well (Bonfield and Speh 1977; Hotchkiss 2009; Wilson and Mathews 1971). A recent study by Google also indicates a rapid rise in the percentage of B2B purchasers in the 18-34 year old demographic. According to this study, 46% of business purchase decision makers fall into this age group as of 2014 (Snyder and Hilal 2015).

The goal of our study is to take initial steps towards a rigorous understanding of how ‘embeddedness’ in the world of digital technologies plays a role in business purchasing behavior. A literature review on measuring digital embeddedness reveals more sophisticated measurements than age group alone. In fact, this unidimensional measurement can even be misleading (Hargittai, 2010).

To develop a refined instrument for digital embeddedness, we identify two relevant dimensions, namely *digital aptitude* and *digital attitude*. While *digital aptitude* refers to an individual’s *skills* in using digital technologies, *digital attitude* refers to one’s attitude towards these technologies. These are indeed distinct concepts – for example, one may be highly skilled in using digital technologies, but may still lack trust in information obtained through them. We adopt appropriate instruments to measure each dimension by leveraging relevant literature.

In examining the impact of digital embeddedness on business purchase decisions, this study is among the first to look at individual-level factors in the context of group purchasing. Most prior work relies on the concept of the ‘buying center’, which encapsulates all participants in the decision process. The individual-level view not only provides more granularity on these group decisions, but it is also not unusual for an individual to assume large or even full responsibility for such decisions (Puto, Patton & King 1985; Reeder, Brierty and Reeder 1987). This is particularly true in the case of modified and straight rebuys (Hutt and Speh 1984), which constitute the bulk of business purchases (Hotchkiss 2009).

To gather data that help us examine our phenomena of interest, we created and administered an IRB-approved survey to purchase decision makers in corporate positions. This survey collected both individual-level data regarding digital aptitude and attitude, as well as data on purchasing behaviors. Questions were adopted from established constructs and measures, but were reformulated where appropriate to apply within an organizational context.

As more digitally embedded individuals increasingly permeate high corporate positions, their influence on purchase decisions is expected to increase. Businesses can leverage this study to better understand their target market, and accordingly adjust their approach to marketing, sales, and even product development.

THEORY & HYPOTHESES

Defining Digital Embeddedness

As mentioned previously, the two dimensions of digital embeddedness that this study considers are *digital aptitude* and *digital attitude*. To operationalize *digital aptitude*, we draw from prior studies that measure skills in using digital technologies. We leverage work by Van Deursen, Helsper and Enyon (2014) to adopt a construct for digital aptitude with the following 5

skill indicators: Social, Mobile, Creative, Navigational, and Operational. Their study uses a confirmatory factor analysis to develop and validate a scale that measures skill level on each of these indicators. In our study, we incorporate a modified version of their scale into our survey, and use response data to evaluate overall digital aptitude.

Our notion of digital *attitude* is analogous to the idea of the *digital native*, a term coined by Marc Prensky (2001). This idea was initially developed in the context of education, suggesting that more ‘digital native’ students process information differently, since they grew up in a digital environment. As a result, an older generation of teachers may fail to reach them effectively. Various studies have even made physiological arguments drawing from the theory of neuroplasticity that demonstrate how digital technologies actually ‘re-wire’ our brains (Carr, 2010). Since its inception, the idea of the digital native has been applied in a variety of other contexts, including in fact B2B marketing (Hotchkiss, 2009).

To operationalize the notion of having a ‘digital attitude’, this study leverages work by Helsper and Enyon (2009). Their study defines this notion of a digital native as one who (1) goes to the Internet first for information (2) uses the Internet as a primary source for learning and (3) has high Internet self-efficacy. This construction is true to the attitudinal nature of the concept. The survey questions in our study that prompt for the above information are adopted from the Oxford Internet Survey, from which Helsper and Enyon also collected their data.

Purchasing Behaviors

Having established digital embeddedness measures as our independent variable, we would like to also define measures for purchasing behaviors for our dependent variables. For the purposes of this study, we restrict ourselves to 4 categories of purchasing decision factors, namely:

1. Importance of objective (e.g., price, functionality) vs. subjective (e.g., brand, relationship with vendor) factors
2. Importance of interpersonal influence
3. Risk attitude
4. Consumer innovativeness

In the realm of business transactions, buyers have often relied on proxies for quality, such as brand. Factors including brand (Brown et al 2011; Matzler, Grabner-Krauter and Bidmon 2008; Chaudhuri and Holbrook 2001), relationship with and loyalty to vendor (Wind 1970; Rauyruen and Miller 2007), and direct communication with vendor (Hotchkiss 2009) have all been demonstrated or considered to play a role in mitigating the risks of business purchasing. Factors such as these have been referred to as ‘subjective’ (Brown et al 2011).

In a consumer context, the Internet and digital technologies have been shown to diminish the importance of these subjective factors in favor of more objective ones (Simonsen and Rosen 2014). Our study aims to investigate this effect in an organizational context, where the added complexity would arguably make such proxies even more important.

Interpersonal influence is also a factor in purchase decisions within both a consumer and organizational context (Bearden and Etzel 1982; Bearden, Netemeyer and Teel 1989; Park and Lessig 1977; Silk and Kalwani 1982). Since we expect digital technologies to help people make decisions more objectively, it may also be the case that they do so more independently.

We identified three distinct but relevant types of influence for the purposes of this study: utilitarian, informational, and value-expressive influence. Utilitarian influence refers to an

individual's desire to comply with the expectations of others in order to reap benefits or avoid losses (Burnkrant and Cousineau 1975; Park and Lessig 1977). Informational influence, on the other hand, is defined as the tendency to accept information from others (e.g., co-workers, competitors) as evidence of reality (Deutsch and Gerard 1955). Lastly, value-expressive influence is motivated by an individual's desire to enhance their image through referent identification (Kelman 1961).

Given the risky nature of business purchases, approaches to risk-handling can be considered even the most important factor in determining individual buying styles (Wilson et al 1971). Both risk attitude (Pennings and Smidts 2000) and risk perception (Choffray and Johnston 1979) are considered in our study. These constructs are indeed distinct, as prior work demonstrates (Sarasvathy, Simon and Lave 1998).

Lastly, this study looks at the topic of consumer innovativeness in purchasing behavior. While several constructs to measure 'consumer innovativeness' have been produced, this study adopts the 'motivated consumer innovativeness' concept of Vandecasteele and Geuens (2009). Their study divides innovativeness into 4 dimensions, as per the following:

- Functional – task management and accomplishment improvement
- Hedonic – affective stimulation or gratification
- Social – self-assertive social need for differentiation
- Cognitive – mental or analytical stimulation

Model & Hypotheses

Each of the 4 aforementioned categories of purchase behaviors corresponds to a set of hypotheses regarding their relationship to digital embeddedness. Measures for each construct related to these purchase behaviors are adopted from prior survey-based research. Table 1 offers a summary of these purchase behaviors, along with the hypotheses about them.

Table 1 – Constructs used and their hypothesized relationship to Digital Embeddedness

Purchasing Behavior Construct	Relationship to Digital Embeddedness	Source(s)
H1.1 Brand Sensitivity	-	Hutton 1997; Kapferer and Laurent 1988; Zablah Brown and Donthu 2010
H1.2 Objective factor importance	+	Adapted from 'Brand Importance' from Hutton, 1997
H1.3 Attitudinal loyalty	+	Zeithaml et al, 1996
H1.4 Importance of direct communication	-	Constructed for this study based on Zenz and Thompson 1994; Monczka et al. 2002
H2.1 Informational influence	-	Bearden, Nedemeyer and Teel 1989; Park and Lessig, 1977
H2.2 Utilitarian influence		Bearden, Nedemeyer and Teel 1989; Park and Lessig, 1977
H2.3 Value-expressive influence	-	Bearden, Nedemeyer and Teel 1989;

		Park and Lessig, 1977
H3.1 Individual risk propensity	+	Donthu and Garcia 1999; Donthu and Gilliland 1996
H3.2 Risk perception	-	Choffray and Johnson 1979
H4.1 Motivated consumer innovativeness - functional	+	Vandecasteele, and Geuens, 2010
H4.1 Motivated consumer innovativeness – hedonic	+	Vandecasteele, and Geuens, 2010
H4.1 Motivated consumer innovativeness – social	+	Vandecasteele, and Geuens, 2010
H4.1 Motivated consumer innovativeness - cognitive	+	Vandecasteele, and Geuens, 2010

In order to measure the relationship between constructs, we employ partial least squares structural equation modeling (PLS-SEM). The choice of PLS (i.e., components-based) as opposed to the covariance-based approach is based on the nature of this study. Specific advantages of PLS that apply to this study include that it (1) can assess models theory-skeletal fields, (2) can assess complex models, (3) is capable of handling formative constructs, (4) eliminates concerns over identification issues, and (5) is superior with small samples (Ringle, Sarstedt and Straub 2012; Hair et al 2013).

Following principles in Petter et al (2007), we can infer that the studies on digital aptitude and attitude consider each of these constructs to be reflective. Digital embeddedness, however, is a second-order formative construct with digital aptitude and attitude constructs as indicators.

Since the full SEM contains many dependent variables, presenting it within one diagram would be difficult to digest. Figure 1 presents a generalized view on the model and hypotheses. In this diagram, the ‘Purchasing Behavior Construct’ label represents any of the constructs under the column of the same title in Table 1. The path coefficient between them represents the hypothesis, and is labeled as such in the figure.

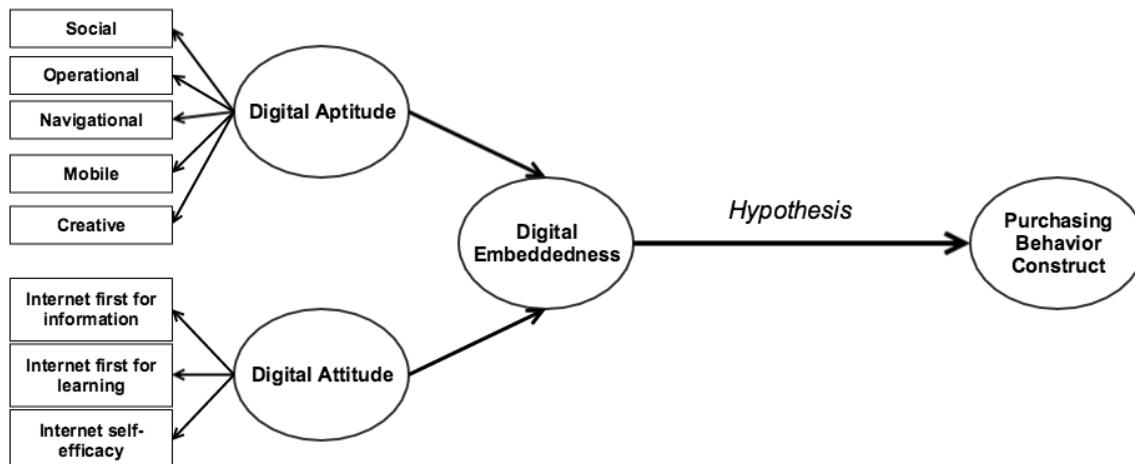


Figure 1. Generalized SEM representing model and hypotheses

DATA

While it may be possible to collect some data on business-to-business transactions, any publicly available data would not connect individual-level characteristics of the purchase decision maker to the purchase decision. To collect such data for our study, we developed an IRB-approved survey. In addition to collecting individual-level data on digital embeddedness, the survey also included questions on purchasing behaviors, as measured by previously mentioned constructs. The survey was detailed, and the average amount of time spent on it was just over 20 minutes.

The survey incorporated several measures to ensure validity and reliability of the data. Subjects were asked about their role in their employer's purchasing process to establish whether they were indeed valid candidates for our study. Additionally, we included built-in redundancies to filter out respondents who were either untruthful or unattentive. Given the length of the survey, some partial responses were excluded when they did not contain crucial data to test our hypotheses. Of the 77 responses we have collected so far, 52 satisfy the aforementioned criteria. The survey is ongoing, and with the help of a recently obtained grant we expect to have 200 usable responses by the end of February 2016.

EMPIRICAL ANALYSIS

Empirical analysis of the model was carried out in SmartPLS 3 software. Before executing PLS SEM, we validated our measurement model by assessing content validity, convergent validity and discriminant validity. Content validity was established by design when formulating measurement items within the survey. Convergent and discriminant validity were established using standard tests as per Hair (1998) and Fornell and Larcker (1981), respectively.

Running a standard PLS SEM gives us the path coefficients. Bootstrapping was used to generate standard errors for hypothesis tests, as per Hair et al 2013. The resulting path coefficients can be seen in table 2.

Table 2 – Impact of Digital Aptitude and Attitude on Purchasing Behaviors

Purchasing Behavior Construct	Digital Embeddedness: Path Coeff (Std Dev ⁺)
H1.1 Brand Sensitivity	-.083 (.726)
H1.2 Objective factor importance	-.041 (.283)
H1.3 Attitudinal loyalty	.4082 (4.082)***
H1.4 Importance of direct communication	.597 (5.812)***
H2.1 Informational influence	-.105(.945)
H2.2 Utilitarian influence	-.255(1.771)*
H2.3 Value-expressive influence	-.259(1.924)*
H3.1 Individual risk propensity	.304 (.016)**
H3.2 Risk perception	-.048 (.353)

H4.1 Motivated consumer innovativeness - functional	-.144 (.455)
H4.1 Motivated consumer innovativeness – hedonic	-.082 (.413)
H4.1 Motivated consumer innovativeness – social	.298 (1.654)*
H4.1 Motivated consumer innovativeness - cognitive	.681 (9.677)***

Significance: *(p<.1), **(p<.05), ***(p<.01)

[†] Denotes number of standard deviations away from 0

Within the hypotheses on importance placed on objective vs. subjective factors (H1), the data shows significance in the case of attitudinal loyalty and importance of direct communication. Attitudinal loyalty measures an individual's association with the brand (Chaudhuri and Holbrook 2001), which can be demonstrated for example by spreading positive word of mouth about the brand (Zeithaml 1996). Digital technologies carry an association with sharing content, which may be the explanation for this behavior.

Contrary to our hypothesis, digital embeddedness has a significant *positive* relationship with importance placed on direct communication. While there is no clear explanation for this in the context of this study, it may be a topic for further exploration in another study.

While we hypothesized that more digitally embedded individuals would place more importance on objective features over subjective ones, the data do not suggest such a relationship. While the path coefficient between digital embeddedness and brand sensitivity is indeed negative, we cannot reject the null hypothesis that such a relationship does not exist at any reasonable significance level. We also saw a negative relationship between digital embeddedness and objective factor importance, contrary to our hypothesis, although the value is also not significant.

Among the hypotheses concerning interpersonal influence (H2), all path coefficients were negative, as expected. While the path coefficients for utilitarian and value-expressive influence were marginally significant, that of informational influence was not. The explanation for this may be that more digitally embedded individuals have increased confidence in their own assessments, thanks to their high aptitude and attitude towards the digital technologies that can help them make decisions. As a consequence, they have less desire to conform to expectations of others. Informational influence may have a weaker effect due to its impersonal nature.

In terms of risk (H3), the data show that more digitally embedded individuals have a higher risk propensity, suggesting that they are more tolerant of risk when making purchases. However, there is no significant link between digital embeddedness and risk perception, suggesting that being more digitally embedded does not make an individual more optimistic about taking risks.

Finally in terms of motivated innovative consumerism (H4), the data show a significant positive link between digital embeddedness and the cognitive dimension, a marginal positive link with the social dimension, and insignificant links with hedonic and functional dimensions. This suggests that more digitally embedded buyers are most concerned with innovation insofar as it satisfies their analytical desires and their desires for social differentiation.

While not all of our hypotheses are supported by the data we have so far, in some cases even the negative results are interesting. For example, while anecdotal evidence from talking to real buyers during our study suggests that digital technologies make them more innovative consumers, these empirical results identify what type of innovation they are looking for.

CONCLUSION & DISCUSSION

While the world of business-to-business transactions is considered difficult to comprehend, our study takes initial steps towards understanding crucial aspects of this process. Given the importance of both the individual-level view on purchasing and the role of digital technologies in transforming purchasing behaviors, it is useful to have a framework through which to view these phenomena. Our study provides such a framework. Furthermore, it contributes a set of hypotheses on purchasing behaviors. These hypotheses, although only partially supported, would be interesting to track in coming years.

While a survey approach can connect individual-level factors to purchase behaviors, this approach faces several inherent limitations. As with most survey research, our sample may not accurately represent the target population. Furthermore, while the individual-level view may be important in many cases, organizational purchase decisions are still frequently made in groups. Still, as more digitally embedded decision makers climb the corporate ladder, the individual-level view may offer a glimpse into the future that can help us understand emerging trends.

Thus far, our data collection has allowed us to validate and refine our survey instrument, and give us a sense of what hypotheses to focus on as we adjust the survey before further data collection. Moving forward, we plan to leverage grant funding to collect data en-masse and explore these hypotheses more deeply.

A potential direction for further research may be to examine how firm-level factors interact with individual-level ones to impact purchase behaviors. For example, one could look at how the 'digital embeddedness' of a firm contributes to these behaviors. Organizational climate and culture may be other interesting dimensions to study. Furthermore, digital embeddedness may have effects on factors beyond the realm of purchase decisions, for which the framework established in this study can be useful.

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