

Do e-business strategies matter? The antecedents and relationship with firm performance

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Abstract Previous studies in e-business strategy focus on the issues of strategic positioning and its impact on firm performance. However, these studies do not address the antecedents to business strategies formulation and their impact on business performance or the role of business models in explaining e-business firm performance. This study applies Porter's generic strategies to the e-business context. It also identifies business models that are applied to the e-business environment and environmental factors and then examines these factors influence on firm performance with survey data. This study finds that uncertainty has a negative impact on the choice of strategic position of e-business firms, whereas market turbulence positively affects the level of adoption of all the strategies. Among

the strategic positions, marketing differentiation positively influences firm performance. The research methodology, test results, and implications are further discussed.

Keywords Competitive strategy · Environmental factors · E-business model · Firm performance

1 Introduction

The Internet, in particular the Web, has become a critical aspect of today's business so that understanding how organizations utilize technology to compete is invaluable for a firm's survival and profitability (Krause, Scannell, & Calantone, 2000). Currently, firms use the Internet for a wide range of business activities, including advertising, sales and customer services and rely on the Web as an alternate or major channel for branding their products, transactions and public relations (Agarwal & Venkatesh, 2002). E-business sales will increase from \$85.7 billion in 2003 to \$229.0 billion in 2008 and online retail sales will reach 10% of total U.S. retail sales in 2008, as estimated (Rush, 2003). However, the business impact of the Internet is a double-edged sword. While the use of the Internet can reduce coordination and transaction costs, it also has the potential to threaten the survival of inefficient firms by reducing profit opportunities (Agarwal & Venkatesh, 2002; Bakos, 1998).

Strategic positioning is critical to the long-run survival of any firm (Kettinger, Grover, Guha, & Segars, 1994), particularly to e-business companies since operating on the Internet brings almost transparent information sharing and consequently, hyper-competition to the market. Note that we define e-business as aggregated business activities via online networks, in particular via the Internet (Kalakota &

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Whinston, 1996). To establish effective strategies that include new venues for creative rethinking of business models, processes, and relationships formed by the new technology (Feeny, 2001), it is necessary to better understand the issues related to strategy formulations, market environment, business models and their impact on firm performance (Metcalf, 1999; Porter, 2001).

Previous studies in e-business strategy focus on the issues of strategic positioning and its impact on firm performance within the dynamic Internet market (Koo, Koh, & Nam, 2004; Lederer, Mirchandani, & Sims, 1997; Lederer, Mirchandani, & Sims, 2001; Mellahi & Johnson, 2000; Metcalfe, 1999). However, these studies do not address the antecedents to business strategies formulation and their impacts on business performance, as well as the role of business models in explaining e-business firm performance. Therefore, the research questions are: What are the environmental factors and business models that influence the formulation of e-business strategies? Which business strategies increase an e-business firm's performance? In order to address the proposed research questions, we first apply Porter's generic strategies to the e-business context. Next, we identify business models and environmental factors present in the e-business market. Finally, we examine how these factors influence e-business firm performance.

Insight into the role of environmental factors and business models associated with each business strategy leads to a more informed decision process and a better decision outcome. In addition, understanding the relationship between e-business strategies and firm performance allows managers to focus effective business strategies relevant to their firms.

In the remainder of this paper, we discuss e-business strategies based on Porter's competitive strategies. Subsequently, we elaborate the proposed research model and hypotheses. We then discuss the research methodology and results in the discussion and implications section. Finally, we conclude with the implications and recommendations for future research.

2 Theoretical background

In this section we review the theoretical foundation for the current study, Porter's framework of competitive strategy, one of the most widely accepted business planning models (Bourgeois, 1996; Pearce & Robinson, 1994; Thompson & Strickland, 1995). Porter (2001) argues that companies participating in e-business need to establish their own generic competitive strategies to effectively take advantage of Internet technologies. In particular, Porter (1980) suggests three different types of generic strategies—cost

leadership, differentiation or focus as the response to industry structure and sustainable competitive advantage. This model (1980) provides a general framework for understanding how firms gain and maintain competitive advantages in the competitive e-business environment.

With the advent of information technology and the emergence of new business models that change market dynamics, new studies applying this framework to e-business are needed. Several studies (Gonsalves, Lederer, Mahaney, & Newkirk, 1999; Lederer et al., 2001; Rangan & Bell, 1998) report that e-business companies rely more on product differentiation and market focus strategies rather than cost leadership strategy. These studies also argue that the strategic position of a firm has a significant impact on its performance. However, the studies do not provide substantial evidence to draw this conclusion. This study will explore the antecedents to e-business strategies and the impact of the strategy on firm performance and provide empirical evidence. In the remainder of this section, we elaborate on each type of strategy in the specific context of e-business.

Cost leadership Cost leadership focuses on low cost, relative to that of competitors, without overlooking other areas, including quality and service (Porter, 1980). This strategy has been taken by many companies in stable markets where firms can maximize their profits by lowering operating costs or by demanding a premium price (Miller, 1987; Porter, 2001). Cost advantage can be accomplished through economies of scale or superior process effectiveness (Timmers, 1999). Accordingly, the rules of the game of cost leadership are determined by the amount of accessible resources. Companies enjoying greater access to resources are, in general, more likely to lean toward cost leadership initiatives, but firms with less access to resources tend to focus on differentiating products and services for a narrowly defined market (Wright, 1987). This argument holds true for traditional market competitions. However, the growth of the Internet and e-business has significantly changed the market dynamics where even small firms may have greater access to resources than large firms do (Brynjolfsson & Smith, 2000).

It is often presupposed that electronic markets will force firms to compete on price, as the Internet lowers search costs, reduces information asymmetry for both sellers and buyers and accommodates many competing vendors offering similar products and services (Bakos, 1991; Brynjolfsson & Smith, 2000). This leads Internet companies to offer lower price than traditional market price. For example, prices of books and CDs sold on the Internet are 9 to 16% lower on average than those sold through conventional channels (Brynjolfsson & Smith, 2000).

Furthermore, electronic markets lower entry barriers and operational costs helping to keep the costs low (Brynjolfsson & Smith, 2000). On the contrary, there is evidence that contradicts the increasing price competition assumption in e-business (Degeratu, Rangaswamy, & Wu, 2000). Even in e-business, brand-loyal customers are less sensitive to price (Pan, Ratchford, & Shankar, 2002) so that companies with the ability to provide superior product information to build trust and loyalty can counter the price advantage of competitors (Lynch & Ariely, 1998). Moreover, in some cases, including car auction markets (Lee, 1998) and retailing (Bailey, 1998), traditional market prices are lower than online market prices.

Hence, even though e-business companies are facing the pressure of cutting prices in general, due to low entry barriers, lower operating costs and symmetric information sharing, they may not pursue the cost leadership strategy to compete. Cost leadership is still effective as a strategic initiative; even a small company with low operating costs can pursue this strategic avenue.

Marketing differentiation Differentiation strategies require companies to provide customers with unique and valuable products and services to increase loyalty (Porter, 1980). Differentiation strategies, particularly in e-business, allow firms to charge abnormal margins for products and services deemed unique by customers (Timmers, 1999). Execution can be facilitated by information technology that allows creatively exploiting electronic market channels (Porter & Millar, 1986). In many cases, the first movers to or adopters of e-business benefit from the unique service or product offerings on the Internet, because those offerings are regarded as a fresh trial and reduce the transaction costs of traditional shopping.

However, by the very nature of the Internet, such as low entry barriers and hyper-competition, the abnormal returns for early movers could not last long. Competitors with more resources quickly move to the market and provide the same or even superior products and services. For example, upstart online firms may possess fewer resources including information about customers and brand name, so that competitors can easily take over the niche market developed by the upstart online firms (Barrett, 1999a, b; Reid, 1998). Many brick-and-mortar companies with more resources and experience quickly deploy online channels and compete head-to-head with upstart online firms (Porter, 2001).

With the growth of information technology and electronic business adoption, companies are asked to be more creative and unique to gain a better strategic position in the market. To differentiate themselves from competitors, companies may have to build their reputation through high quality, reliability, convenience or prestige (Scherer, 1980),

keep strengths by marketing differentiation in terms of brand name, like Amazon (Barrett, 1999a, b; Reid, 1998) and establish voluminous customer information, accurate forecasting ability, and industry standards (Whittington, Pettigrew, Peck, Fenton, & Conyon, 1999). These activities increase switching costs of customers, which in turn enhances repurchase rate (Machlis, 1998).

Innovative differentiation Miller (1986, 1987) extends Porter's competitive strategy framework to propose innovation-based differentiation strategy that differs from operational and marketing efficiency-based strategy. Innovative differentiation strategy concerns a dynamic market environment that could provide the innovator with a substantial advantage over its competitors (Miles & Snow, 1978). The core driver of innovative differentiation strategy is technology, in particular information technology (Fitzsimmons & Fitzsimmons, 1997).

Information technology as a business enabler provides e-business companies with opportunities to be innovative and to differentiate themselves in the market (Fitzsimmons & Fitzsimmons, 1997). There are several examples of the innovative use of technology to create a strong strategic position in the market. The highly efficient warehousing and delivery system Amazon.com built creatively uses information technology to help the firm outperform both traditional and online competitors (Amit & Zott, 2001). The transaction system built by Priceline.com is another excellent example of applying information technology to innovate in a new business environment. The transaction system based on the concept of reverse auction allows customers to initiate a transaction process by "naming their own prices" and wait for sellers to respond.

However, it is hard to sustain this competitive advantage over an extended period of time. Companies must continuously introduce new innovations and pioneer creative ways of conducting business to keep their strength (Postrel, 1996). For e-business companies, methods to obtain valuable personalized marketing information or tools to simplify and improve security of transaction processes may enhance their business scope.

Focus Market focus strategy refers to initiatives where companies focus on a specific market segment such as a particular group of customers, geographic markets or product line segments (Porter, 1980; Timmers, 1999). Market focus strategy is also believed to be appropriate for firms with fewer resources to compete with firms that have greater access to resources (Wright, 1987).

In the e-business context, there are companies in several anecdotal studies that successfully implemented the focus

strategy. However, it is not clear how market focus strategy works in the context of e-business. No empirical studies have been completed to understand the strategic behaviors of firms and the role of this strategy in determining firm performance in the electronic market. In addition, many startup companies were reported to concentrate their attention on specific products, not on markets, because the target customers could not be easily identified due to the lack of transaction history and knowledge about the customers. This is why traditional businesses like Barnes & Noble rely on their existing resources such as national networks of bookstores, experienced sales forces and established brand name, while online companies like Amazon.com try to introduce innovative customer services along with wider availability of books and competitive pricing (Ghemawat & Baird, 1998). In the current study, the role of the market focus strategy in explaining firm performance is explored to provide empirical evidence.

3 Research model

In formulating the research model, we argue that a firm's business environment and business model influence the strategic choice of e-business companies, which in turn affect firm performance, as shown in Fig. 1.

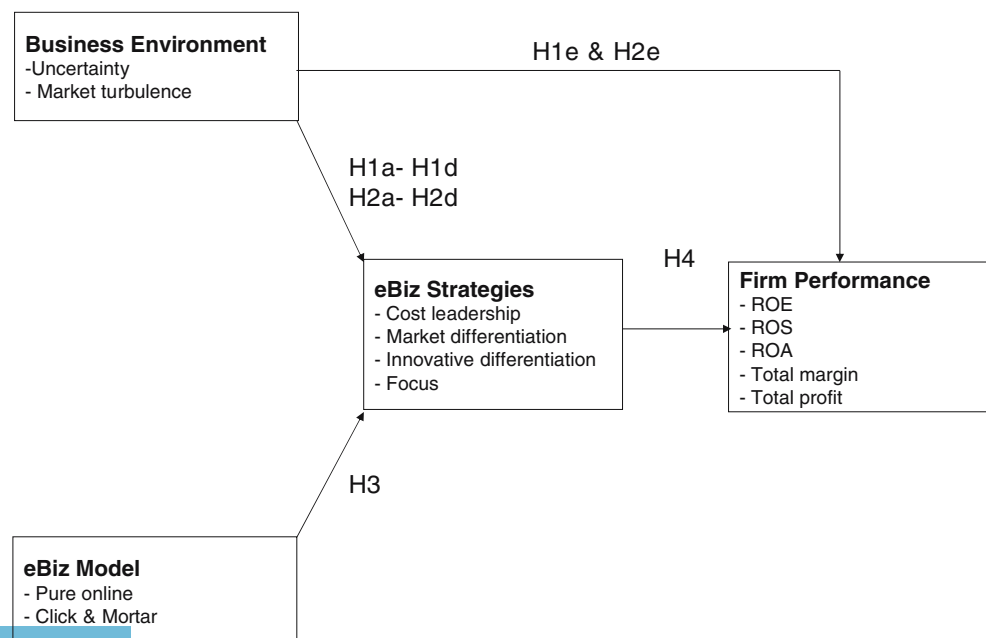
The environmental factors in this study are "factors that reflect environmental and unique situation that could affect sustainability" (Kettinger, Grover, Guha, & Segars, 1994). Environmental factors significantly affect firm's survival and success particularly in a turbulent environment (Subbanarasimha, 2001) and can dictate the choice of

business strategies. The importance of environmental factors in firms' strategy has been recognized in the contingency theory of firms (Donaldson, 2001), which posits that a firm's performance and choice of strategy are contingent on the environment in which it operates. We drew on the existing literature and empirical evidence to identify two of the most important environmental factors that could affect the choice of strategies and firms' performance. They are uncertainty and market turbulence.

With regard to e-business models that also influence the strategic positioning of a firm, we identify two types: pure online and click-and-mortar. The firms with the pure e-business model opt to exclusively operate in the Internet market and use it as a substitute for traditional markets. In this model, the firm does not have any physical presence for the purpose of business transaction with its customers. On the contrary, the firms with the click-and-mortar model tend to participate in the Internet market in a complementary manner and enhance their activities in its traditional markets, enabling customers to purchase through its physical presence or its Internet stores. Our categorization of these models corresponds to previous studies, such as Internet retailers and Internet hybrid, physical retailers and electronic retailers and net firms and non-net firms (Brynjolfsson & Smith, 2000; Evans & Wurster, 1999; Subramani & Walden, 2001). In the current study, the e-business models are also assumed to carry differential impacts on both business strategy formation and firm performance.

In the remainder of this section, we elaborate the impacts of the antecedents on both the choice of strategic positions of e-business firms and firm performance. The antecedents include environmental factors and e-business models.

Fig. 1 Research model



Environmental factors and strategy With the tremendous technological advances, most firms are confronted with unpredictability and dynamism, in which firms are unable to forecast other competitor’s behavior (Jauch & Kraft, 1986; Miller, 1988). In particular, the Internet and information technology have transformed market dynamics by lowering search cost, increasing information symmetry for both sellers and buyers, and allowing many competing vendors to offer similar products and services at competitive prices (Bakos, 1998; Brynjolfsson & Smith, 2000). Cao and Gruca (2003) argue that when a hybrid firm with loyal offline customers lowers its online price to attract new online customers, it must also lower the price for its offline customers. Consequently, the firm will have lower profits in both online and offline markets. Therefore, each firm needs to seriously recognize such ongoing changes to maintain a stable level of performance (Milliken, 1990).

Environmental changes are characterized as uncertainties and market turbulence that influence decisions, structure and performance of firms (Jauch & Kraft, 1986). Uncertainty in this study refers to the lack of knowledge about competitors’ action, the number of possible competitors and customers’ preferences resulting from changes in market conditions. Market turbulence refers to the volatility of products and services, consumer demand and sales attributable to technological, economical, and cultural change (Dobni & Luffman, 2003).

In general, it is agreeable that to survive the uncertain environment and turbulent market, managers need to pay attention to their environments and define the current trends, which may reflect on the strategic position in the market (Day & Nedungadi, 1994). An appropriate strategic positioning helps firms differentiate themselves from exist-

ing and potential competitors in choosing market position based on customers’ needs and accessibility as well as those products or services (Hoffman, Novak, & Peralta, 1999; Porter, 1980). The strategic choices Google, Yahoo, Amazon, and Barnes and Noble made may exemplify the strategic positions firms can take to address the changes in market conditions. The strategic position Google and Barnes and Noble took is the one in that focus strategy is in the center. Google focuses on the depth of its business in search engines rather than extends its business areas and Barnes and Noble concentrates its business in bookselling and tries to provide more convenient services to customers. On the contrary, the strategic position taken by Yahoo and Amazon focuses on innovative differentiation. Yahoo and Amazon have extended their services with B2C transaction to accommodate the recent technological advance and to deal with the diversified customer needs (Timmers, 1999). Although their strategic positions are different from each other, the distinctive strategy to obtain competitive advantages makes the online retailers successful (Porter, 2001).

Although environmental factors shape the strategic positioning which in turn influence firm performance, uncertainty and market turbulence work in a different manner. The uncertainty is caused by the variety of products/services offered through the Internet so that it makes it difficult to forecast consumer’s demand, which may negatively affect the strategic formation of companies. It is also argued that pursuing cost leadership under uncertain environments results in the loss of profitability due to the heavy investment in technology which incurs considerable sunk costs (Miller, 1988). On the other hand, the frequent changes in market conditions, i.e., market turbulence, require firms to be more innovative and flexible, which asks companies to focus more on changes in consumer

Table 1 Demographics of sample

By Industry Type			
	Pure Online	Click-and-Mortar	Total
Retail	24	21	45 (36.6%)
Online Service	25	18	43 (35.0%)
Financial Service	15	11	26 (21.1%)
Manufacturing	0	2	2 (1.6%)
Other	4	3	7 (5.7%)
By Business Model			
	Sales (\$ million)	Years in Business	Number of Employees
Pure Online	10.7	2.9	69.2
Click-and-Mortar	23.7	4.2	159.8
By Respondent Position			
	Pure Online	Click-and-Mortar	Total
Mid-level Manager	40	31	71 (57.7%)
Senior Manager	17	20	37 (30.1%)
CEO/Founder	11	4	15 (12.2%)

Table 2 Constructs and items used in study

Constructs	Items
Cost Leadership (CL)	What is the position of your firm via in comparison to your competitors, regarding: (1: Very low–5: very high) CL1: Price leadership CL2: Production and service cost advantage CL3: Operation cost advantage
Marketing Differentiation (MD)	What is the position of your firm vis-à-vis your main competitors, regarding: (1: Very weak–5: very strong) MD1: Design of products and services MD2: Quality of products and services MD3: Quality of customer services MD4: Breadth of product or services
Market Focus (MF)	What is the position of your firm via your competitors, regarding...(Very low–very high) MF1: Cost reduction effort for the target market MF2: Price competitiveness in the target market MF3: Innovative process for the target market MF4: Geographical segmentation of the market
Innovative Differentiation (ID)	How difficult is it for your main competitors to imitate, regarding...(Very easy–very difficult) ID1: Design of products and services (design uniqueness) ID2: Business processes (process uniqueness) ID3: Unique technology for product/service differentiation
Uncertainty (UNCER)	How does your company perceive each of the following environmental factors? (Very easy–very hard) UNCER1: to predict the action of competitor UNCER2: to predict the number of competitors who are well established UNCER3: to predict demand and consumer tastes
Market Turbulence (MT)	How rapidly does the composition of customers and their preferences change? (Very low–very high) MT1: Customer's preferences change quite a bit over time MT2: Demand for our product/service from customers MT3: New customers tend to order product-related needs that are different from the past.
Performance (PER)	How do you assess your company's performance in comparison to your competitors with regard to each of the following performance criteria? (Very low–very high) PER1: Return on sales (ROS) PER2: Return on asset (ROA) PER3: Return on equity (ROE) PER4: Total profit PER5: Total margin
e-Business Model	Pure Online or Click-and-Mortar

needs (Dobni & Luffman, 2003). This positive relationship between the environmental scanning behavior and the strategic positioning was empirically tested (Jennings & Lumpkin 1992). Jennings and Lumpkin (1992) reported that companies placing more value on consumer needs usually pursued differentiation strategies. Therefore, with regard to the impact of two environmental factors on strategy formulation and firm performance, the following two sets of hypotheses can be postulated.

H1a–H1d: The level of uncertainty influences the level of the adoption of cost-leadership, marketing differentiation, innovative differentiation and focus strategy.

H1e: The level of uncertainty negatively influences firm performance.

H2a–H2d: The level of market turbulence influences the level of the adoption of cost-leadership, marketing differentiation, innovative differentiation, and focus strategy.

Table 3 Reliability measures for model constructs and construct correlation

Constructs	Cronbach's Alpha	CFR ^a	AVE ^b
Uncertainty (UNCER)	0.83	0.86	0.68
Market Turbulence (MT)	0.79	0.85	0.66
Cost Leadership (CL)	0.84	0.88	0.71
Marketing Differentiation (MD)	0.83	0.85	0.58
Innovative Differentiation (ID)	0.89	0.88	0.72
Focus (FO)	0.84	0.87	0.63
Performance (PER)	0.94	0.94	0.74

^a Composite factor reliability

^b Average variance extracted

H2e: The level of market turbulence negatively influences firm performance.

e-Business models: Pure online versus click-and-mortar firms In general, firms competing in the electronic market can be categorized into pure online firms like Amazon.com and click-and-mortar firms like Barnes & Noble. Due to the low entry barriers, online firms easily enter the market and compete with traditional brick-and-mortar firms. Traditional firms also benefit from entering the Internet market by reaching customers that have been considered out of reach due to geographic and market barriers.

These two types of firms behave quite differently when formulating their strategic position, because they have different motivations and resources and compete on different strategic strengths (Porter, 2001). The online firms tend to maximize the use of the Internet as their only business channel, whereas click-and-mortar firms are likely to leverage their existing resources to maximize profit from e-business as well as to avoid channel conflicts (Ghemawat & Baird, 1998). As discussed earlier, pure online firms can create, through a creative use of technology, a highly efficient warehousing and delivery system or an unprecedented transaction system based on the concept of reverse auction to compete with incumbent firms (Amit & Zott, 2001). Traditional businesses leverage their resources including strong

reputation on quality, reliability and convenience and customer base to offer unique products and services, proprietary contents, distinctive physical activities, sophisticated product information and personalized customer services.

The type of e-business model may affect the choice of strategic positions and the choice of strategic position affects firm performance. Therefore, we hypothesize that:

H3a–H3d: E-business models are associated with the level of adoption of cost-leadership, marketing differentiation, innovative differentiation and focus strategy.

Strategic positions and firm performance Different environment, strategy and structural combinations make an impact on firm performance (Christensen & Montgomery, 1981; Hambrick, 1983; Lenz, 1980). In particular, formulating appropriate strategic positioning through the understanding of industry structure and internal strengths is critical to the long-run survival of firms (Krause et al., 2000). Therefore, in order to survive and make profit in the growing Internet market, firms have to establish and execute effective market strategies. Several studies on the relationship between strategic position and firm performance (Koo, Koh, & Nam, 2004; Lederer et al., 1997) indicate that in the e-business context, strategic choices have a close relationship with firm performance. In some cases, the strategic position chosen by a company significantly affects firm performance across environmental

Table 4 Confirmatory factor analysis: Measurement model

Constructs	Items	Loading	t-value	R ²
Uncertainty (UNCER)	Uncer1	0.78	10.71	0.56
	Uncer2	1.00	0.00	0.70
	Uncer3	0.88	12.38	0.58
Market Turbulence (MT)	MT1	0.84	9.68	0.53
	MT2	1.00	0.00	0.71
	MT3	0.78	8.48	0.47
Cost Leadership Strategy (CL)	CL1	1.00	0.00	0.82
	CL2	0.73	11.02	0.63
	CL3	0.66	10.64	0.51
Marketing Differentiation Strategy (MD)	MD1	0.71	7.43	0.41
	MD2	0.83	10.54	0.60
	MD3	1.00	0.00	0.70
	MD4	0.81	8.09	0.53
Innovative Differentiation Strategy (ID)	ID1	0.96	15.05	0.80
	ID2	1.00	0.00	0.84
	ID3	0.76	11.32	0.59
Focus Strategy (FO)	FO1	0.85	8.52	0.45
	FO2	1.00	0.00	0.70
	FO3	0.94	12.25	0.67
	FO4	0.91	9.05	0.49
Performance (PER)	ROE	1.00	0.00	0.74
	ROS	0.91	16.37	0.76
	ROA	0.94	17.03	0.76
	Total Profit	0.97	16.01	0.74
	Total Margin	0.94	16.86	0.77

Table 5 Fit indices for the measurement model and estimated model

Goodness-of-Fit Indices	Measurement Model	Estimated Model	Recommended Cut-off
Normed Chi-square (Chi-square/d.f.)	1.19	1.33	Below 3
CFI (Comparative Fit Index)	0.97	0.95	Above 0.90
TLI (Tucker–Lewis Index)	0.97	0.94	Above 0.90
GFI (Goodness-of-Fit Index)	0.85	0.81	Above 0.90
AGFI (Adjusted Goodness-of-Fit Index)	0.82	0.80	Above 0.80
RMSEA (Root Mean Square Error of Approximation)	0.039	0.052	Below 0.06
NNFI (Non-normed Fit Index)	0.97	0.94	Above 0.90
SRMR (Standardized Root Mean Square Residual)	0.055	0.083	Below 0.10

factors (Dobni & Luffman, 2003). Thus, the following hypothesis concerning firm performance can be postulated.

H4a–H4b: The different types of strategies are associated with firm performance.

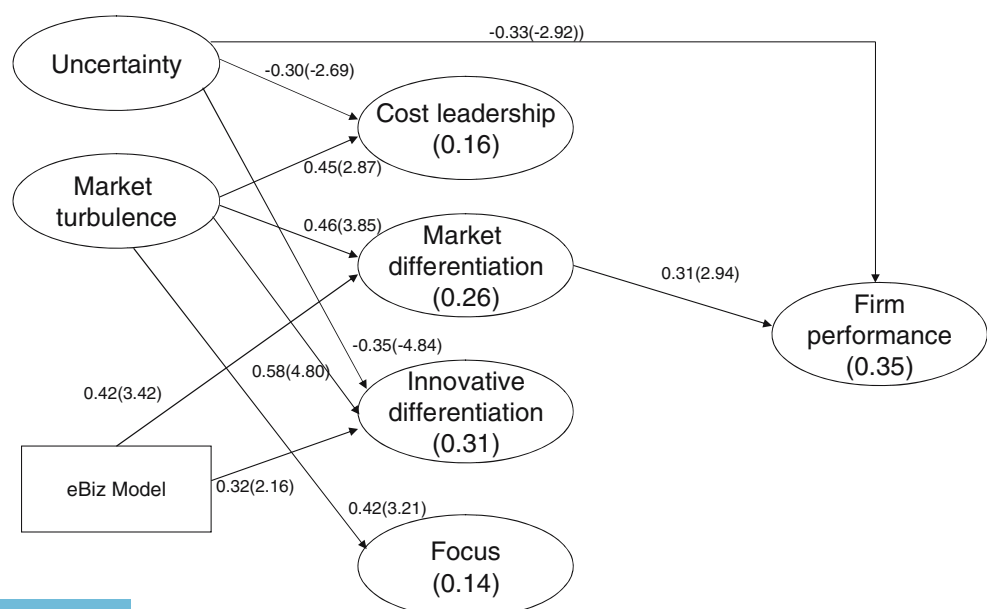
4 Research method

Data collection To test the hypotheses we conducted a survey with firms operating in Korea. We developed a survey instrument with questions derived from the literature on Porter's competitive strategies, environmental factors and business performance discussed in earlier sections. The instrument was first prepared in English and then translated into Korean. To reduce semantic disparity due to cultural and linguistic differences, the instrument in Korean was translated back into English and any potentially confusing wording and phrases were carefully revised. The questionnaire was then pre-tested with the founders of 13 Internet businesses to improve the clarity and relevance of the questions.

We extracted a sample for the study from a directory published by the Korea National Statistical Office. We randomly chose 1,000 firms from the directory and distributed the questionnaire by mail. The target respondents were CEO, IS manager, or strategic planning managers. In order to increase participation in this study, we contacted them via post card, e-mail, and phone in two weeks later. A total of one hundred and twenty three firms ($n=123$) responded with a response rate of 12.3%.

Demographics Of the 123 firms surveyed, 68 were classified as pure online firms and 55 as click-and-mortar. Table 1 breaks down the demographics of participating firms.

Measurement We measured the constructs based on thorough literature review in order to obtain content validity. First, we measured strategies based on the definitions provided by Porter (1980) and the items used in previous studies (Durand & Coeurderoy, 2001; Galbraith & Schendel, 1983; Kotha & Vadlamani, 1995). Cost leadership was measured using three items—price leadership, production and operation cost advantage. Marketing differentiation

Fig. 2 The estimated model

was measured using four items—design and quality of product and service, quality of customer service, and breadth of produce and service. Design uniqueness of products and services, business process uniqueness and unique technology for product/service differentiation were used in measuring innovative differentiation strategy. Focus was measured using four items—cost reduction effort for the target market, price competitiveness in the target market, innovative process for the target market and the geographic segmentation of the market (Durand & Coeurderoy, 2001; Galbraith & Schendel, 1983; Kotha & Vadlamani, 1995).

Uncertainty was measured using three items—easy to predict competitors' action, easy to predict the number of possible competitors and easy to predict demand and customers' tastes (Miller & Droge, 1986). Market turbulence was measured using three items—changes in customers' products/services preferences, product/service demand and sales patterns (Jaworski & Kohli, 1993). In measuring business performance, respondents were asked to indicate their performance in comparison with their competitors in terms of return on sales (ROS), return on assets (ROA), return on equity (ROE), total profit and total revenue over the past few years (Ramanujam & Venkatraman, 1986; Venkatraman & Ramanujam, 1986).

Finally, respondents were asked to indicate their business model as either pure online or click-and-mortar firms. Table 2 summarizes the items used in this study.

Reliability and validity The exploratory factor analysis assessed initial validity and showed no significant cross loading. The results of exploratory factor analysis (EFA) indicated that there were six different factors for all independent constructs and no cross loading above 0.40 as reported in Table 6 in Appendix (McKnight, Choudhury, & Kacmar, 2002).

The reliability of the constructs was measured using Cronbach's alpha, composite factor reliability (CFR) and average variance extracted (AVE) and are reported in Table 3. All Cronbach's alpha values are well above the threshold of 0.70. Similarly, all CFR values are well above the cut-off value of 0.70 and all AVE values are well above the cut-off value of 0.50 (Segars, 1997), together providing support for the reliability of the constructs.

Confirmatory factor analysis (CFA) established the convergent validity. The CFA factor loadings, t -values and items R^2 are reported in Table 4.

Mplus software developed by B. Muthén and O.L. Muthén (2003) was used for the estimation of the measurement model and the SEM estimation of the research model. The high values for factor loadings support con-

vergent validity for the constructs. Furthermore, the t -values for factor loadings of manifest variables were well above 2.0 as shown in Table 4, supporting the statistical significance of factor loadings (Muthén & Muthén, 2003). The measurement model fit indices are reported in Table 5. The normed chi-square was 1.19, which is desirably below the cut-off value of 3.0 (Krause et al., 2000). RMSEA was 0.04, below the 0.06 cut-off (Hu & Bentler, 1999), indicating a satisfactory model fit. CFI and TLI indices were 0.97, both above the cut-off value of 0.90 for the continuous outcomes case (Bhattacharjee, 2002; Hu & Bentler, 1999; Krause et al., 2000). GFI was 0.85, which is below the recommended threshold. However, AGFI is 0.82, which is above the cut-off value of 0.80 (Gefen, Straub, & Boudreau, 2000). Furthermore, NNFI (Non-normed Fit Index) was 0.97, which is above the cut-off value of 0.90. These results suggest that the measurement model adequately fits the data. In addition, we investigated the standardized Root Mean Square Residual (SRMR) as an index for badness-of-fit, as suggested by Muthén and Muthén (2003). The SRMR for the measurement model was 0.055, well below the suggested threshold of 0.10, providing further support for the model fit (Byrne, 1998; Hu & Bentler, 1999).

Following the procedure suggested by Gefen, Karahanna, and Straub (2003), we assessed discriminant validity by comparing original measurement model (CFA) with seven latent variables against other measurement models with seven constructs, which included every possible combination of collapsing two constructs into one. While the fit indices of the estimated models suggests an acceptable fit to the data as reported in Table 4 above, the chi-square value in the original CFA was significantly better (smaller) than all combinations of the reduced measurement models. Table 7 in Appendix indicates that there exists sound discriminant validity. Another guideline for discriminant validity is the square root of AVE for each construct should be greater than the correlation values of the construct with other constructs (Bhattacharjee, 2002; Segars, 1997). Table 8 shows the correlation among constructs and the AVE for each construct.

Results of structural model test Testing our research model was based on structural equation modeling. The estimation results of the research including the estimated model parameters, their t -values, and R^2 values for constructs are shown in Fig. 2 below.

The SEM estimation has normed Chi-square of 1.33, which is below the recommended threshold of 3. As Table 5 shows, other fit indices, RMSEA, CFI, TLI, AGFI, NNFI and SRMR are desirably at or well above the recommended threshold values. However, GFI is below the recommended threshold value.

Hypotheses 1a to 1d posited that uncertainty influences four different types of strategies formulation. The estimation results lend support for H1a and H1c, with t -values -2.69 and -4.84 , respectively. Hypotheses 2a to 2d in Fig. 1 posited market turbulence significantly influences strategies formulation. The estimation results support all four hypotheses with t -values ranging from 2.87 to 4.80. Hypotheses 1e and 2e posited that uncertainty and market turbulence influence firms' performance. Only hypothesis 1e was supported with a t -value of -2.92 . Hypotheses 3a to 3d posited that e-Business model is associated with strategies formulation. Hypotheses 3b and 3c were supported. In addition, R^2 values for four different strategy types were 0.16, 0.26, 0.31, and 0.14, respectively. Finally, in formulating hypotheses 4a to 4d, we argued that different types of strategies influence firms' performance. However, we found only marketing differentiation strategy influences firms' performance with a t -value of 2.94.

In sum, the results indicate that business environment and e-business model have some effects on formulating e-business strategy. Also, business environment and e-business strategy type influence firm performance.

5 Discussion and implication

In the current study, we set out to explore the role of environmental factors and e-business models in explaining the choice of strategic positions and to examine the impact of the strategic position on firm performance. Initially, we applied Porter's generic strategies (1980) and Miller's extended model (Miller, 1986, 1987) to the e-business context to verify the relevance of those strategies. We then identified environmental factors and e-business models as the antecedents to strategic formation. Finally, we examined how the environmental factors and e-business models affect the choice of strategic positioning and firm performance and the relationship between strategy and firm performance. The results of the structural model test show a partial support for the model, as discussed above. Figure 2 illustrates the significant paths of the estimated model.

According to the results, uncertainty negatively affects the adoption of cost leadership and innovative differentiation strategy and firm performance, which confirms the argument that firms which pursue cost leadership under uncertain environments may experience the loss of profitability (Miller, 1988). That is, when the market condition is uncertain, it may be risky to pursue cost leadership and innovative differentiation strategy. These strategies may entail heavy investments in technology to achieve economies of scale, process effectiveness and innovation (Miller, 1988). In addition, the difficulty in predicting consumer demand may cause problems with production schedule and material purchase and thus lead to low firm performance.

Hypotheses 2a–2e posit that market turbulence influences four different types of strategies as well as firm performance. The results show that market turbulence positively influences the level of the adoption of all strategies, while it does not have a direct impact on firm performance. As discussed earlier, to survive the turbulent market caused by technological innovation and severe competition, companies need to be more innovative and flexible to adapt their strategic positions to changes in the market and consumer needs (Dobni & Luffman, 2003), while they can stay competitive in terms of cost leadership (Brynjolfsson & Smith, 2000). This strategic adaptation may mediate the impact of market turbulence to firm performance. The swift and relevant adaptation of the strategic positions may allow firms to respond to the volatility of market conditions commensurately such that the companies can sustain a stable level of performance (Milliken, 1990).

The results also indicate that e-business models carry some influence on the choice of distinctive strategic positions such as market and innovative differentiation. As discussed earlier, click-and-mortar businesses, when introducing e-business, tend to leverage their resources to offer unique products and services, distinctive physical activities, and personalized customer services (Ghemawat & Baird, 1998; Porter, 2001). This tendency can be understood in terms of the notion of complementarity between traditional business and e-business. The effect of the e-business channel investment on firm performance can better be realized with the presence of strong off-line business infrastructure that permits the exploitation of e-business investments. This complementarity between click-and-mortar and e-business leads to better firm performance. If brick-and-mortar firms obtain a fully coordinated move in structure, processes and boundaries for their e-business initiatives, they can enjoy significantly positive performance (Pettigrew et al., 2003; Whittington et al., 1999). For example, if companies offer unique and specialized products and services to customers using their knowledge base acquired from their existing businesses, they may benefit from the e-business more than pure online firms.

Finally, the results indicate that among the strategies, marketing differentiation strategy may have a significant effect on firm performance. This result is congruent with the contention that the advent of information technology facilitates market segmentation and allows companies to creatively exploit electronic market channels (Porter & Millar, 1986). E-business companies can acquire, through various Internet tools including cookies and logs, detailed information about the customers and their behaviors in the Internet. They can then categorize the customers based on a set of specific criteria to serve each segment in a different manner such as different prices and specialized services. Providing differentiated products and services can enhance customer loyalty to a company, increase switching costs of

customers and thus increase customer loyalty for repurchase (Machlis, 1998).

In sum, the findings of this study indicate that uncertainty has a negative impact on the choice of strategic position of e-business firms, whereas market turbulence positively affects the level of adoption of all the strategies. Among the strategic positions, marketing differentiation strategy positively influences firm performance.

Concluding remarks The current study examined the impact of environmental factors such as uncertainty and market turbulence and e-business models on the choice of strategic positions and firm performance. The proposed research model was partially supported by the data. This study is expected to contribute to the literature in two ways. First, this study positioned environmental factors and e-business models together as the antecedent variables that affect the choice of competitive strategy in the electronic market. The insight into the role of environmental factors and business models may allow managers to make more informed decisions resulting in better decision outcomes. Second, this study examined the relationships between various strategic positions and firm performance. The understanding of these relationships allows managers to focus on effective business strategies relevant to their firms.

However, this study is not free from limitations and we advise readers to exercise caution when they interpret the results. Data was collected from a sample of medium to small size firms, so the results may not be readily applied in the case of large firms. In addition, data was collected from one country. This study would be able to provide better results through comparative analyses, if data is collected in multiple countries. The current study focuses on the environmental factors and e-business models as the antecedents to strategic choice and firm performance. It does not investigate how firms' existing strengths and capabilities can be used to further competitive advantages and performance. Therefore, future study needs to be extended to examine and apply resource based perspectives to e-business contexts. The current study did not include other variables such as the nature of the industry and market and organizational characteristics that may have affected the results. Future studies are asked to analyze the effect of these variables on strategic formation and firm performance.

Appendix

Supporting Tables

Table 6 Exploratory factor analysis

Items	F1	F2	F3	F4	F5	F6	F7
UNCER1	-0.105	-0.104	0.045	-0.098	0.060	0.829	0.225
UNCER2	-0.255	0.135	0.005	-0.066	-0.074	0.799	0.165
UNCER3	-0.080	0.151	0.008	-0.147	-0.162	0.837	0.027
MT1	-0.024	-0.015	0.052	0.132	0.075	0.141	0.836
MT2	0.170	0.108	0.089	0.065	-0.019	0.170	0.825
MT3	0.146	0.151	0.071	0.063	0.080	0.060	0.771
CL1	0.198	0.111	0.089	0.108	0.855	-0.148	0.039
CL2	0.026	0.071	0.140	0.044	0.848	-0.134	0.115
CL3	0.060	0.177	0.052	0.134	0.826	0.099	-0.006
MD1	0.089	0.046	0.774	0.206	-0.048	0.069	-0.008
MD2	0.171	0.187	0.794	0.147	0.032	-0.094	0.105
MD3	0.195	0.221	0.775	0.099	0.170	0.019	0.078
MD4	0.136	0.196	0.706	0.130	0.221	0.063	0.094
ID1	0.133	0.024	0.212	0.866	0.099	-0.195	0.031
ID2	0.140	0.054	0.223	0.858	0.140	-0.124	0.105
ID3	0.225	0.042	0.144	0.817	0.078	-0.025	0.165
FO1	-0.053	0.791	0.070	0.011	0.099	0.098	-0.009
FO2	0.111	0.828	0.120	0.061	0.121	0.080	0.178
FO3	0.119	0.812	0.204	0.094	0.083	0.049	0.063
FO4	0.180	0.742	0.183	-0.038	0.069	-0.062	0.050
ROE	0.844	0.073	0.289	0.045	0.087	-0.053	0.085
ROS	0.855	0.071	0.073	0.118	0.118	-0.142	0.108
ROA	0.840	0.119	0.117	0.148	0.096	-0.197	0.103
TPROFIT	0.875	0.100	0.138	0.111	0.028	-0.044	0.008
TMARGIN	0.892	0.042	0.060	0.142	0.030	-0.073	0.069
% of variance	27.5	13.6	9.2	8.4	7.3	5.6	4.2
Eigenvalue	6.88	3.40	2.30	2.11	1.82	1.39	1.04

Table 7 Pairwise discriminant analysis of constructs^a

Models	χ^2_{df}	χ^2 Difference from Original
Original measurement model	$\chi^2_{254} = 301.48$	–
Performance and Cost leadership	$\chi^2_{260} = 460.87$	159.39
Performance and Marketing differentiation	$\chi^2_{260} = 478.31$	176.83
Performance and Innovative differentiation	$\chi^2_{260} = 515.05$	213.57
Performance and Focus	$\chi^2_{260} = 502.69$	201.21
Performance and Uncertainty	$\chi^2_{260} = 453.36$	151.88
Performance and Market turbulence	$\chi^2_{260} = 427.47$	125.99
Cost leadership and Marketing differentiation	$\chi^2_{260} = 442.14$	140.66
Cost leadership and Innovative differentiation	$\chi^2_{260} = 453.84$	152.36
Cost leadership and Focus	$\chi^2_{260} = 450.78$	149.30
Cost leadership and Uncertainty	$\chi^2_{260} = 460.70$	159.22
Cost leadership and Market turbulence	$\chi^2_{260} = 473.98$	172.50
Marketing and Innovative differentiation	$\chi^2_{260} = 455.94$	154.46
Marketing differentiation and Focus	$\chi^2_{260} = 432.13$	130.65
Marketing differentiation and Uncertainty	$\chi^2_{260} = 473.64$	172.16
Marketing differentiation and Market turbulence	$\chi^2_{260} = 417.95$	116.47
Innovative differentiation and Focus	$\chi^2_{260} = 546.81$	245.33
Innovative differentiation and Uncertainty	$\chi^2_{260} = 453.76$	152.28
Innovative differentiation and Market turbulence	$\chi^2_{260} = 429.40$	127.92
Focus and Uncertainty	$\chi^2_{260} = 469.98$	168.50
Focus and Market turbulence	$\chi^2_{260} = 418.35$	116.87
Uncertainty and Market turbulence	$\chi^2_{260} = 447.89$	146.41

^aThis table shows that the chi-square of the original CFA is significantly smaller than the CFA of any alternative model. Since combining two latent variables adds six degrees of freedom to the model, the chi-square differences between the original CFA and any alternative model should be greater than at least 20.48. As this table shows, all differences are above the threshold

Table 8 Construct correlation values and comparison with average variance extracted in the measurement model

	1	2	3	4	5	6	7	AVE
1. Uncertainty	(0.82)							0.68
2. Market Turbulence	0.33	(0.81)						0.66
3. Cost Leadership	-0.22	0.15	(0.84)					0.71
4. Marketing Differentiation	-0.01	0.28	0.35	(0.76)				0.58
5. Innovative Differentiation	-0.29	0.23	0.32	0.47	(0.85)			0.72
6. Focus	0.14	0.29	0.31	0.50	0.19	(0.79)		0.63
7. Performance	-0.32	0.25	0.30	0.42	0.37	0.27	(0.86)	0.74

The numbers in parentheses are the square root of each AVE value

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