The Effect of Environmental Dynamism on Business Model Innovation: The Mediating Role of Strategic Flexibility

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Abstract: There is a growing body of literature on business model innovation, but research on antecedents is still underdeveloped. This paper provides an integrated search for creating and implementing business model innovation with environmental dynamism as an external trigger and strategic flexibility as an internal driver. Thus, the relationship between environmental dynamism and business model innovation is investigated quantitatively in this study. Furthermore, it is proposed that strategic flexibility acts as a mediator between environmental dynamism and business model innovation. The analysis of data from 201 ICT firms in Türkiye indicates that environmental dynamism indeed positively affects the adoption of business model innovation. Additionally, the findings show that strategic flexibility partially mediates the relationship between environmental dynamism and business model innovation.

Keywords: Environmental Dynamism, Business Model Innovation, Strategic Flexibility.

Çevresel Dinamizmin İş Modeli İnovasyonuna Etkisi: Stratejik Esnekliğin Aracılık Rolü

Özet: İş modelleri üzerine giderek artan bir literatür mevcut ancak öncüllere ilişkin araştırmalar hâlâ gelişmektedir. Bu makale, dış tetikleyici olarak çevresel dinamizm ve iç etken olarak stratejik esneklik ile iş modeli inovasyonunun yaratılması ve uygulanması için bütünleşik bir araştırma sunmaktadır. Bu nedenle bu çalışmada çevresel dinamizm ile iş modeli inovasyonu arasındaki ilişki niceliksel olarak incelenmiştir. Ayrıca stratejik esnekliğin çevresel dinamizm ile iş modeli inovasyonu arasında aracılık görevi üstlendiği ileri sürülmektedir. Türkiye'deki 201 BT firmasından elde edilen verilerin analizi, çevresel dinamizmin gerçekten de iş modeli inovasyonunun benimsenmesini olumlu yönde etkilediğini belirtmektedir. Ayrıca bulgular, stratejik esnekliğin çevresel dinamizm ile iş modeli yeniliği arasındaki ilişkiye kısmen aracılık ettiğini göstermektedir.

Anahtar Kelimeler: Çevresel Dinamizm, İş Modeli İnovasyonu, Stratejik Esneklik

1. Introduction

Business model of the firm defines the “design or architecture of the value creation, delivery, and capture mechanisms”(Teece, 2010, p. 172). This explains the logic of delivering value to customers, customers' willingness to pay for this value, and converting those payments to profit. Because value, therefore, customers are at the center of business models, business models cannot remain static over time. The changing needs of customers create opportunities or threats and push firms to innovate their business models.(Amit & Zott, 2015; Chesbrough, 2007; Cortimiglia et al., 2016; Demil & Lecocq, 2010; Heij et al., 2014; Teece, 2010) Business model innovation occurs “by adding new activities, linking activities in novel ways, or changing which party performs an activity”(Amit & Zott, 2015, p. 40) in an organization’s activity system. In short, business model innovation can be identified by novel changes in at least one of the three core dimensions of a business model: value creation, value proposition, and value capture. (Clauss, 2017)

One of the conceptual arguments that explain business model innovation is based on changes in the environment. While macro changes (e.g., new technologies, and globalization) blur the boundaries between industries and increase the level of competition, they also force firms to reconsider and redesign their goals. (Massa et al., 2017, p. 74) Business model innovation offers a new level of analysis for innovation beyond a single product, service, or process innovation to pace with high dynamic environments. Dynamic environments are characterized by changes in technologies; differentiated customer preferences, and fluctuations in product demand and supply. (Jansen et al., 2006)

Dynamic capabilities approach provides an explanation for potential antecedents of business model innovation. Dynamic capabilities are “higher order capabilities that an organization uses to shape and deploy (orchestrate) its resource base to meet the current and anticipated needs of the market”. (Leih et al., 2015, p. 3) Strategic flexibility is regarded as a dynamic capability that has innovation outcomes.

Strategically flexible firms can reallocate or reconfigure their flexible assets and coordinate them flexibly to cope with uncertainty. (Sanchez, 1997) Strategic flexibility, as one type of dynamic capability, is mobilized to facilitate innovation and change by realigning resources and activities. Successful business models are made possible by strong dynamic capabilities, which are inextricably linked to the adoption of business model innovation. (Teece, 2014, p. 332) Strategic flexibility by resource flexibility and coordination flexibility provides a critical capability for driving business model innovations.

In this research, the focus is on one contingent variable: business model innovation. The aim is to get a clear understanding of the antecedents of business model innovation. To achieve this, the research question of how business model innovation is affected by environmental dynamism is attempted to be answered. In addition, this paper seeks to analyze the role of strategic flexibility during business model innovation in high dynamic environments.

There is a growing body of knowledge accumulated around business model innovation, still, yet limited number of studies quantitatively examined the antecedents.(Andreini & Bettinelli, 2017; Foss & Saebi, 2017; Zhang et al., 2021) To reveal more general answers, quantitative research on business model innovation is much more needed. In this study, the above-mentioned research gap is also addressed by quantitatively analyzing the causal relationship between antecedences (namely, environmental dynamism and strategic flexibility) and business model innovation.

2. Theoretical background and Hypotheses development

2.1. Environmental Dynamism

Environmental dynamism refers to the amount and unpredictability of changes in the task environment or the principal industry of the firm. (Dess & Beard, 1984, p. 56; Miller & Friesen, 1983) Environmental dynamism is characterized by changes in technology, fluctuations in supply or demand, variations in customer preferences, and entries or exits to the markets. (Volberda & van Bruggen, 1997) As the environment's dynamic characteristic increases, the unpredictable feature of dynamism heightens the uncertainty for the key organizational elements. Firms are required at least to achieve the expected level of firm performance by aligning with the environment or seizing opportunities. (Dess & Beard, 1984) In high dynamic environments, innovation is used as an instrument to renew firms themselves to depart from the products, services or market needs that have become obsolete.(Dess & Beard, 1984; Jansen et al., 2006; Miller & Friesen, 1983; Seo et al., 2020) In addition, companies switch from their outdated business models to new ones to establish or preserve a competitive advantage, which is followed by strategic analysis and selection processes.(Casadesus-Masanell, Ramon; Ricart, 2011; Teece, 2018)

2.2. Business Model Innovation

A business model is a framework for creating, delivering, and capturing value.(Afuah, 2014; Foss & Saebi, 2017; Teece, 2010) Business model framework identifies components and linkages of how firms create value by using their resources and capabilities along the value chain; how a portfolio of solutions is proposed to the customers; and how proposed solutions are converted into revenues.(Clauss, 2017; Saebi et al., 2017) A Business model articulates the value proposition, specifies the market segments, identifies the structure of the value chain, estimates the cost structure or profit potential, describes the value network between suppliers, and customers, and complements, and formulates a competitive strategy to hold an advantage over competitors. (Chesbrough & Rosenbloom, 2002, p. 534) Business model as a subject of analysis for innovation, offers a different perspective exceeding beyond products and services for creating, proposing, and capturing value. In this respect, innovation is related to the system of products, services, technology, and/or information flows. (Clauss, 2017) Business model innovation activities can range from incremental changes in individual components of business models to the replacement of the existing model with a business model with a fundamentally different potential. (Khanagha et al., 2014, p. 324) Business model innovation then thereby is captured by the changes in its primary dimensions of value creation, value proposition, and/or value capture regardless of their innovativeness. (Clauss, 2017)

2.3. The Effects of Environmental Dynamism on Business Model Innovation

Business models are subject to change over time. Firms intend to revisit or innovate their business models to defeat the threads or to seize the opportunities formed in their environments to pursue their competitiveness. (Chesbrough, 2007; Cortimiglia et al., 2016; Demil & Lecocq, 2010; Heij et al., 2014; Teece, 2010) While external factors like changing

customer needs or new competitors create situations that might force firms to innovate their business models, external factors like changes in key technologies might be sensed as an opportunity that would also trigger firms to innovate their business models.(Bucherer et al., 2012)

Increasing dynamism of environmental factors is widely used to explain the origin of business model innovation. Advances or breakthroughs in the technology is considered as a driver of business model innovation. (Andreini & Bettinelli, 2017, p. 64; Baden-Fuller & Haefliger, 2013; Zott & Amit, 2007) Chesbrough and Rosenbloom for example identify business model as a mediator that connects the technical and economic domains. (Chesbrough & Rosenbloom, 2002) More specifically, some scholars argue how Internet creates a potential for business model innovation by offering a new way of communication.(Amit & Zott, 2001; Casadesus-Masanell, Ramon; Ricart, 2011) Recently, some others discuss the contributions of emerging technologies like Artificial Intelligence to business model innovation. (Reim et al., 2020) Changing customer demands as well as new technologies also create a need for change in business models. Analysis from different sectors highlights that aligning the customer demands with the customer value offered is crucial for the success of the business models. Therefore, firms are forced to change their business models to keep pace with the changing customer demands.(Gockeln, 2014; Henne, 2014; Schneider et al., 2013) Business model innovation is also triggered when the increasing dynamism in the focal market where business is operating, becomes difficult. Firms would be threatened by the rising number of competitors and new entrants to the market, so competing and outperforming the competitors will be very challenging.(Johnson et al., 2008; Sosna et al., 2010) Depending on the strategic orientation, firms tend to innovate their business models (Saebi et al., 2017), by either trying to create a competitive advantage within the focal market(Mitchell & Coles, 2003; Ricciardi et al., 2016; Verma & Bashir, 2017) or looking for new opportunities in creating a new market(Gassmann et al., 2014; Widiarni & Mirzanti, 2023). Theory and observations of firms suggest there is a cause-and-effect relationship between environmental factors (e.g., technology, market, competition) and business model innovation. Thus, it is assumed that high levels of environmental dynamism would trigger the need for change in established business models.

Hypothesis 1: Environmental dynamism has a positive impact on business model innovation.

2.4 Mediating role of strategic Flexibility between Environmental Dynamism and Business Model Innovation

Strategic flexibility emphasizes the ability of the firm to organize its strategies to ensure a dynamic balance between continuity and change to cope with environmental turbulence.(Bahrami & Evans, 2011; Shukla & Sushil, 2020) The ability to organize strategies is considered as dynamic capability(Eisenhardt & Martin, 2000) that can integrate, develop, and restructure the firm's internal and external competencies. Strategic flexibility is regarded as a primal for building and maintaining competitive advantage.(Hitt et al., 1998; Roberts & Stockport, 2009; Singh et al., 2013) In early studies, strategic flexibility is mostly identified as a reactive(Aaker & Mascarenhas, 1984; Jan Eppink, 1978; Sanchez & Heene, 1997) phenomenon that reacts or adopts firm to uncertain environments, recent analysis introduces the proactive aspect(Roberts & Stockport, 2009; Singh et al., 2013; Sushil, 2015) which includes strategic moves transforms the environment as well. Research shows that in constantly changing environments, firms can create strategic options by accessing, reallocating, or reconfiguring the flexible assets, and processes and coordinating them flexibly to achieve strategic flexibility.(Sanchez, 1997, p. 72,73,76,77)

Environmental factors like uncertainty(Aaker & Mascarenhas, 1984; Sanchez, 1997), unpredictability(Jan Eppink, 1978), variations in customer expectations(Harrigan, 1980), opportunities and threats(Roberts & Stockport, 2009, p. 29) are identified as pre-conditions that nurture the need for strategic flexibility. Strategically flexible firms may adopt or create a competitive advantage in such dynamic environments. While the theory highlights that environmental dynamism triggers strategic flexibility, Herhausen et. al(2020) claim environmental dynamism is negatively associated with strategic flexibility. However, most observations prove otherwise. For example, Cingöz and Akdogan's(2013, p. 587) empirical findings support a positive relationship between environmental dynamism and strategic flexibility and identify the environmental dynamism effect on strategic flexibility as "one of the most important factors". According to Nadkarni(2007, p. 262), the complexity of the strategy schema (or dominant logic) promotes strategic flexibility which

successfully performs in fast-changing industries. Sustainability research by Vihari (2019) finds the impact on business model innovation through organizational learning and strategic flexibility. This relationship is strengthened by environmental dynamism. The most recent study (Kafetzopoulos, 2023) examines the drivers of sustainability and finds support that environmental dynamism influences strategic flexibility which also promotes sustainability. Despite negative approaches related to the impact of environmental dynamism on strategic flexibility, the extensive literature supports the positive relationship. Therefore, it is assumed that environmental dynamism is positively related to strategic flexibility.

Hypothesis 2: Environmental dynamism has a positive impact on strategic flexibility.

Literature supports that strategic flexibility has innovation outcomes. (Brozovic, 2018; Herhausen et al., 2020) Strategically flexible firms are expected to introduce new products and services to fulfill changing customer expectations quickly, with high quality and acceptable development costs. Strategic flexibility provides the ability to adapt to changing environments, to create new market opportunities, products, and technological areas, and offer successful new products. (Kandemir & Acur, 2012) Strategic flexibility by flexible resources and coordination flexibility, supports information management skills and rapid decision-making, enabling faster assimilation of new information and supporting entry into new markets or creation of new products. (Kamasak et al., 2016, p. 130) Therefore it is proposed that strategic flexibility may enable business model innovations to cope with environmental change by accessing, reallocating, or reconfiguring the flexible resources(Sanchez, 1995; Zhou & Wu, 2010).

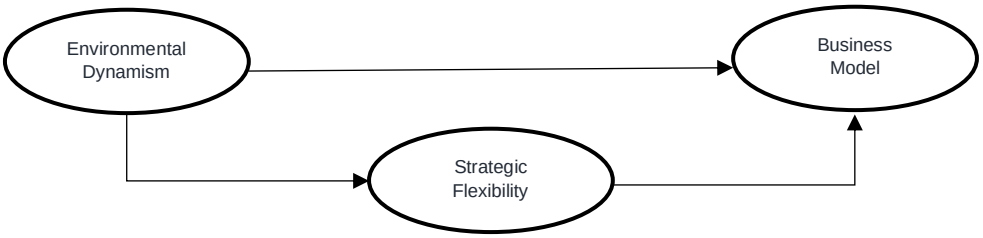
Hypothesis 3: Strategic flexibility has a positive impact on business model innovation.

Firms innovate their existing business model when customer expectations are changing, market competition becomes brutal, and technological changes are disruptive (Bucherer et al., 2012) to defeat the threads or to seize the opportunities. (Chesbrough, 2007; Cortimiglia et al., 2016; Demil & Lecocq, 2010; Heij et al., 2014; Teece, 2010) While strategic management focuses on how to achieve and sustain competitive advantage (Teece et al., 1997), business model offers new ways to create it. In other words, business models are considered a reflection of realized strategy. However, strategy is not just a selection of a business model, it is a plan which also defines patterns for business model changes in contingencies that might occur. (Casadesus-Masanell & Ricart, 2010) Dynamic capabilities approach of strategic management stresses integrating, building, and reconfiguring external and internal competencies of the firm to address changing environments. (Teece et al., 1997) Dynamic capabilities are mobilized by realigning resources and activities to enable innovation and change. (Teece, 2014) Strategic flexibility as a dynamic capability enables firms to create various strategic options to streamline corporate strategies for continuity and change balance by leveraging their internal and external resource base to respond to changes or change the rules of the game. (Aaker & Mascarenhas, 1984; Combe et al., 2012; De Leeuw & Volberda, 1996; Evans, 1991; Jan Eppink, 1978; Sanchez, 1995; Shimizu & Hitt, 2004) Strategic flexibility may thereby enable business model innovations to cope with environmental change by allowing rapid and coordinated realignment of the business's resource base.

Hypothesis 4: Strategic flexibility mediates the relationship between environmental dynamism and business model innovation.

To summarize, Figure 1 illustrates the research model.

Figure 1: Conceptual model



3. Methodology

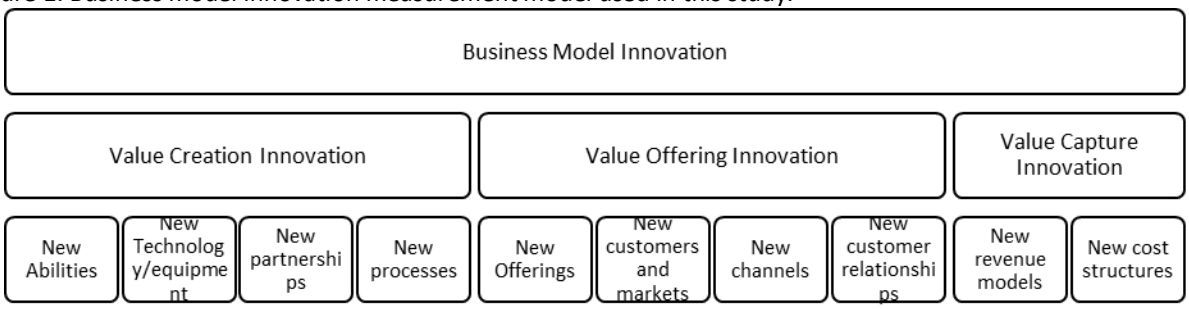
3.1. Measurement

All items, except descriptive items for firms and respondents, were measured on a 5-point Likert scale (ranging from 1 = strong disagreement to 5 = strong agreement.). The model was operationalized by using measurement scales established and validated in prior studies.

Environmental dynamism was measured using five items adapted from Jansen (2006). The construct was built on changes in market, customer demands, environment, and products and services.

Business model innovation measurement models generally consider the construct with three main dimensions namely value creation, value offering, and value capture. Business model innovation may be captured by the changes in these dimensions. (Clauss, 2017; Spieth & Schneider, 2016) In this study, business model innovation was measured by a hierarchical three-level scale adapted from Clauss. (Clauss, 2017) At the first level, ten subconstructs were measured by 33 reflective items. At the second level three dimensions, namely value creation innovation, value offering innovation, and value capture innovation were used as formative measures. At the third level, the meta-construct of business model innovation was formatively formed by these three dimensions. Business model innovation scoring model used in this study is illustrated in Figure 2.

Figure 1: Business model innovation measurement model used in this study.



Strategic Flexibility was operationalized as a firm's ability to reallocate, reconfigure rapidly and continuously its resource base, and coordinate them flexibly in response to changing environments. Strategic Flexibility was measured by a scale consisting of 2 dimensions (Resource Flexibility and Coordination Flexibility) and 9 items, developed by Zhou and Wu(2010) and adopted by Wei, Yi, and Guo(2014).

3.2. Data collection

The survey data were collected from the ICT sector in Turkey to test the abovementioned hypotheses. The sample covers 1834 firms. Given the lack of sufficient databases in Turkey, the sample was gathered from multiple databases namely BT Haber journal, ICT 500 list (BT500), The Union of Chambers and Commodity Exchanges of Türkiye (TOBB), Istanbul Chamber of Industry(ISO), and Information Technologies and Communications Institution (BTK). The questionnaires were sent to the decision-maker from each firm with a cover letter that explained the purpose of the study and ensured the confidentiality of their replies. A final sample size of 201 responses was achieved from IT (83%) and Telecommunication (17%) sub-sector companies. 85% of the firms operate in a business-to-business environment, 54% business-to-consumer environment, 32% business-to-government, and 4% consumer-to-consumer environment. While 46% of firms operate in one environment, the rest operate in two or more environments. The respondents are 61% company owner/partner, 22% top manager, 10% middle manager, 2% first level manager, 2% senior expert, and 4% expert. The response rate of all contacted firms was 10.9%.

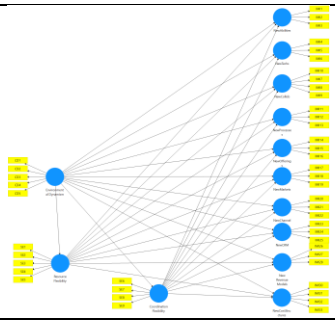
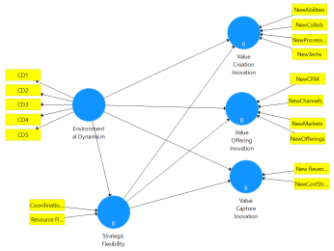
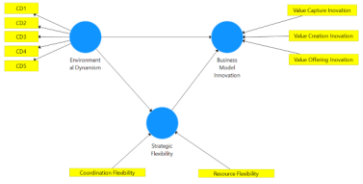
Being aware of the method bias within collected data, some precautions have been taken to reduce the risk. To minimize any potential common method variance coming from a single source (Podsakoff et al., 2003), all respondents are assured their anonymity and confidentiality that there are no correct or incorrect responses, and that they should respond with the utmost sincerity. (Chang et al., 2010) Another aspect depends on the complexity of the model which respondents are not likely to be able to predict the relationships under investigation. (Chang et al., 2010)

3.3. Specification and Estimation of the Model

To test the hypotheses, partial least squares (PLS) structural equation modeling (SEM) was used to analyze the data. PLS-SEM was selected based on some advantages, in particular handling both reflective and formative measurement models, examining the relationship between high-level structures and the data did not show a normal distribution. (Hair et al., 2019) Analysis was conducted by using SmartPLS 3.2.9 software (Ringle et al., 2015). Hence PLS-SEM relies on bootstrapping for testing significance (Henseler et al., 2009), and all the calculations were based on 5000 bootstrap.

Environmental dynamism is a first-order construct whilst strategic flexibility is a second-order construct and business model innovation is specified as a third-order construct. Hence, strategic flexibility is type II reflective-formative, business model innovation is reflective-formative-formative constructs, two-step disjoint approach was used for estimation. (Becker et al., 2012, p. 365; Sarstedt et al., 2019, p. 3; Wetzels et al., 2009, p. 180) A two-step approach is preferred to be followed when the study focuses on the effects between higher-order constructs and the formative hierarchical latent variables in endogenous position. (Becker et al., 2012; Ringle, 2012) The estimation required two sequential steps which the first step was repeated twice to form the third-order construct. First, the factor scores of the first-order constructs in a model were calculated without the presence of second-order constructs. Second, these factor scores were used to form formative indicators of second-order construct in a respective analysis. Third, the latent variables from the second-order construct were used as formative indicators of the third-order construct, which is business model innovation in our study. The illustration is shown in *Table 1* for the described steps.

Table 1: Two-step disjoint approach steps applied in the study.

Step	Constructs	Actions	Path Model
1	First-order constructs with their indicators. (Reflective),	- Calculation of the first-order factor scores - Measurement model evaluation for the first-order constructs	
2	Second-order construct with the formative indicators as latent variables obtained from the first-order factor scores. (Formative)	- Calculation of the second-order factor scores - Measurement model evaluation for the second-order constructs	
3	Third-order construct with the formative indicators as latent variable obtained from the second-order factor scores. (Formative)	- Measurement model evaluation for the third-order constructs - Hypothesis testing	

4. Results

4.1 Measurement model results

The reliability and validity of the measurement model were investigated before testing the hypothesis. The reflective measurement model was assessed by factor loadings, composite reliability (CR), and average variance extracted (AVE) for convergent validity and the Fornell-Larcker Ratio and HTMT, for discriminant validity. (Yıldız, 2021) The investigation was required a minor adjustment to the measurement model by eliminating "We do not rely on the durability of our existing revenue sources." item from business model innovation first-order construct "new revenue models". The final measurement model satisfied the proposed thresholds for loadings, composite reliability (CR), and average variance extracted (AVE). (Hair et al., 2013, p. 103; Henseler et al., 2009) The loadings range from 0,673 to 0,917 providing good indicator reliability. The composite reliability of all constructs was higher than 0,7 varying from 0,820 to 0,919. All the values exceeded the threshold value of 0,5 for AVE (0,566 - 0,756) thus convergent validity was sustained. (*Table 2*) Since the square root of AVE values exceeded the intercorrelations of the constructs, the Fornell-Larcker criterion (Fornell & Larcker, 1981) was satisfied. (*Table 3*) Hetrotrait-monotrait (HTMT) ratio criteria were also tested. The HTMT values of all the first-order construct pairs were below the more conservative threshold of 0.85.(Henseler et al., 2015)

Table 2: Evaluation of the first-order outer reflective model

First-Order Construct	Items	Loadings	CR	AVE
Environmental Dynamism	CD1	0,701	0,878	0,591
	CD2	0,767		
	CD3	0,845		
	CD4	0,763		
	CD5	0,763		
NewAbilities	IMI1	0,738	0,842	0,642
	IMI2	0,866		
	IMI3	0,794		
NewTechs	IMI4	0,819	0,895	0,739
	IMI5	0,896		
	IMI6	0,862		
NewCollob	IMI7	0,766	0,886	0,662
	IMI8	0,883		
	IMI9	0,727		
	IMI10	0,869		
NewProcesses	IMI11	0,816	0,852	0,657
	IMI12	0,828		
	IMI13	0,787		
NewOfferings	IMI14	0,784	0,864	0,681
	IMI15	0,888		
	IMI16	0,800		
NewMarkets	IMI17	0,829	0,884	0,718
	IMI18	0,917		
	IMI19	0,791		
NewChannels	IMI20	0,863	0,903	0,756
	IMI21	0,907		
	IMI22	0,837		
NewCRM	IMI23	0,828	0,897	0,744
	IMI24	0,891		
	IMI25	0,867		
New Revenue Models	IMI26	0,829	0,820	0,604

First-Order Construct	Items	Loadings	CR	AVE
	IMI27	0,821		
	IMI28	0,673		
NewCostStructures	IMI30	0,721	0,855	0,599
	IMI31	0,742		
	IMI32	0,813		
	IMI33	0,816		
Resource Flexibility	SE1	0,737	0,867	0,566
	SE2	0,810		
	SE3	0,769		
	SE4	0,708		
	SE5	0,732		
Coordination Flexibility	SE6	0,807	0,919	0,741
	SE7	0,867		
	SE8	0,884		
	SE9	0,882		

Table 3: Discriminant validity analysis first order constructs

	First-order constructs	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Environmental Dynamism	**0,769**												
2	NewAbilities	0,267	**0,801**											
3	NewTechs	0,281	0,634	**0,860**										
4	NewCollob	0,312	0,351	0,236	**0,814**									
5	NewProcesses	0,342	0,530	0,512	0,310	**0,811**								
6	NewOfferings	0,245	0,614	0,628	0,275	0,549	**0,825**							
7	NewMarkets	0,342	0,515	0,475	0,426	0,460	0,544	**0,847**						
8	NewChannels	0,266	0,256	0,240	0,447	0,342	0,266	0,492	**0,869**					
9	NewCRM	0,355	0,346	0,307	0,348	0,473	0,390	0,392	0,392	**0,862**				
10	New Revenue Models	0,334	0,438	0,298	0,429	0,455	0,402	0,428	0,404	0,514	**0,777**			
11	NewCostStructures	0,347	0,347	0,310	0,376	0,401	0,399	0,497	0,359	0,401	0,400	**0,774**		
12	Resource Flexibility	0,283	0,318	0,294	0,308	0,390	0,373	0,451	0,303	0,243	0,344	0,418	**0,752**	
13	Coordination Flexibility	0,280	0,426	0,347	0,417	0,413	0,415	0,543	0,432	0,354	0,414	0,472	0,624	**0,861**

1 Numbers on the diagonal represent the square root of AVE and the number below the diagonal are correlation between constructs

2 All coefficients are significant at p<0,01

The measurement model for the second-order formative constructs modeled in Step 2 was also evaluated. To evaluate the formative measurement models, the indicator weights and outer model variance inflation factors (VIFs) were investigated.(Cenfetelli & Bassellier, 2009, p. 281; Hair et al., 2013, pp. 118–166) Two formative indicator weightings representing new abilities and new technologies had not significantly formed their second-order construct (value creation innovation). To evaluate these indicators' absolute importance for their construct, loadings were investigated. Because the external loadings were above the threshold value (>0.5), the indicators were left for ongoing analysis.

One indicator representing "NewOfferings"'s critical t-values for a two-tailed test was 1,815 which is above 1,65 explaining the significance level below 10 percent. (Hair et al., 2011) Since the VIFs of all the indicators were below 5, it could be concluded that collinearity was not an issue. (Hair et al., 2019, p. 11)

The measurement model for the third-order formative construct modeled in step 3 was also evaluated. All the outer weights were statistically significant and VIFs were below 3. Second and third-order measurement model results are represented in *Table 4* and *Table 5* respectively.

Table 4: Second-order measurement model results

Second-Order Construct	First-Order Construct	Weights	T Statistics	Loadings	T Statistics	VIF
Value Creation Innovation	NewAbilities	0,187	1,466	0,722	42,485	1,936
Value Creation Innovation	NewTechs	0,187	1,408	0,657	12,648	1,803
Value Creation Innovation	NewCollob	0,499	4,919	0,750	9,467	1,169
Value Creation Innovation	NewProcesses	0,456	4,039	0,805	7,018	1,535
Value Offering Innovation	NewOfferings	0,212	1,815	0,686	9,283	1,504
Value Offering Innovation	NewMarkets	0,555	5,761	0,901	9,502	1,761
Value Offering Innovation	NewChannels	0,257	2,428	0,691	17,052	1,412
Value Offering Innovation	NewCRM	0,267	2,111	0,667	22,408	1,334
Value Capture Innovation	New Revenue Models	0,520	5,424	0,788	8,331	1,190
Value Capture Innovation	NewCostStructures	0,671	8,108	0,879	12,242	1,190
Strategic Flexibility	Coordination Flexibility	0,752	8,131	0,964	7,056	1,639
Strategic Flexibility	Resource Flexibility	0,340	3,193	0,810	12,840	1,639

Table 5: Third-order measurement model results

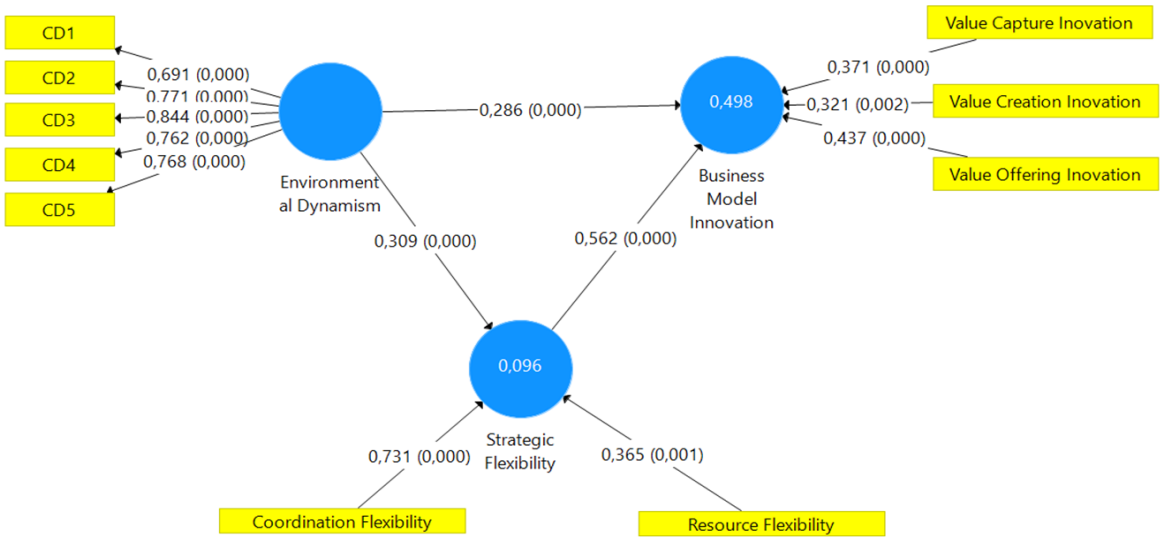
Third-Order Construct	Second-Order Construct	Weights	T Statistics	VIF
Business Model Innovation	Value Creation Innovation	0,321	3,133	2,278
Business Model Innovation	Value Offering Innovation	0,437	3,756	2,525
Business Model Innovation	Value Capture Innovation	0,371	3,908	1,946

4.2 Structural model results

To evaluate the structural model, path estimates, coefficient of determination (R^2), Q^2 predictive significance, effect size (f^2), and standardized root mean square residual (SRMR) were investigated. The R^2 was 0,498 for the model which environmental dynamism and strategic flexibility together would explain %50 variances in business model innovation. This result indicated a moderate explanatory power of the proposed model. Effect size (f^2) examines how removing the antecedent structure will affect the R^2 value of the endogenous variable. (Hair et al., 2019) Values higher than 0,02, 0,15, and 0,35 are considered small, medium, and large f^2 effect sizes. (Cohen, 1988; Hair et al., 2019, p. 11) Environmental Dynamism was found to have a medium effect size on Business model innovation (0,147) and a small effect size on strategic flexibility (0,106). Model fit indices SRMR indicated a satisfactory result (0,053) which the threshold value should be below 0,08. (Hair et al., 2019) All these calculations are presented in *Table 6*.

PLSpredict (Shmueli et al., 2019) was used to assess out-of-sample predictive power. The focus was on the target endogenous construct but all the other endogenous constructs were reported. Hence the Q^2predict value was above 0, and the prediction errors (RMSE) were analyzed to identify the relevant prediction statistics. Comparing the RMSE values from the PLS-SEM analysis with the naïve LM benchmark (*Table 8*) revealed the PLS-SEM analysis produces lower prediction errors for all the indicators; concluded that the model has high predictive power.

Figure 2:Structural Model



To test hypotheses, two models were calculated to capture developments of the explained variance of endogenous variables. Hypothesis 1 proposed a positive relationship between environmental dynamism and business model innovation evaluated as in Model 1. Model 2 extended this relationship by adding the mediation effect of strategic flexibility. In support of Hypothesis 1, environmental dynamism was found to be positively and significantly related to business model innovation. (β =0,286; p<0,001). Hypothesis 2 proposed that environmental dynamism was positively related to strategic flexibility. The results in Model 2 supported the Hypothesis 2 (β =0,309; p<0,001). The impact of strategic flexibility on business model innovation as predicted by Hypothesis 3, was also supported by the dataset (β =0,562; p<0,001). Model 2 structural model is illustrated in *Figure 2*.

Finally, the mediation effect of strategic flexibility on the relationship between environmental dynamism and business model innovation proposed in Hypothesis 4 was tested. The indirect effect in Model 2 was analyzed to assess whether the effect of environmental dynamism on business model innovation is mediated through strategic flexibility (Henseler et al., 2016). The total indirect effect of environmental dynamism via strategic flexibility on business model innovation was found to be positive and significant (β =0,174; p<0,001). Environmental dynamism has a significant indirect effect on business model innovation via strategic flexibility. To assess the scope of this mediation effect, the direct effects of environmental dynamism on business model innovation in Model 2 were compared to Model 1 which only calculates the environmental dynamism on business model innovation without the presence of mediator. (Baron & Kenny, 1986) In model 1, environmental dynamism yielded a significant, direct effect on firm performance (β =0,463; p<0,001). The effect on Model 1 was plunged after the mediation was included (as in Model 2) but remained significant (β =0,286; p<0,001). Supporting Hypothesis 4, partial mediation of the effect was found. *Table 7* presents all path estimates.

Table 6: Model Evaluation

	Model 1	**Model 2**	
SRMR	0,061	0,053	
	DV: BMI	**DV: BMI**	**DV: SF**
R^2	0,214***	0,498***	0,096*
Adjusted R^2	0,210***	0,493***	0,091*
ΔR^2		0,284	
f^2	0,273***	0,147†	0,106†

Q^2_predict	0,184	0,191	0,082
ΔQ^2_predict		0,007	

***p<0,001; **p<0,01; *p<0,05; †p<0,1; BMI: Business Model Innovation; SF: Strategic Flexibility DV: Dependent Variable

Table 7: Path Estimates

	Model 1				Model 2			
	β-value	**T-statistics**	**2.5%**	**97.5%**	**β -value**	**T-statistics**	**2.5%**	**97.5%**
Environmental Dynamism -> Business Model Innovation	0,463***	7,527	0,352	0,591	0,286***	4,243	0,148	0,414
Environmental Dynamism -> Strategic Flexibility					0,309***	4,592	0,180	0,443
Strategic Flexibility -> Business Model Innovation					0,562***	12,786	0,476	0,648
Environmental Dynamism -> Strategic Flexibility -> Business Model Innovation					0,174***	4,340	0,102	0,258

***p<0,001

Table 8: Evaluating the out-of-sample predictive power

	RMSE (PLS)	**RMSE (LM)**	**Q^2_predict**	**PLS-LM**
Value Capture Innovation	0,928	0,941	0,149	-0,013
Value Offering Innovation	0,929	0,942	0,146	-0,014
Value Creation Innovation	0,923	0,939	0,155	-0,016
Resource Flexibility	0,971	0,979	0,070	-0,008
Coordination Flexibility	0,971	0,982	0,067	-0,011

5. Discussion and conclusion

This study examined the specific trigger and driver of business model innovation in the Turkish ICT context. The main objective of this study was to find how business model innovation is affected by environmental dynamism and strategic flexibility. Strategic flexibility based on dynamic capabilities approach is considered as a sensing, seizing, and transforming capability. Four hypotheses were developed to analyze the proposed causal mechanism. The empirical analysis supported all the hypotheses. The results were summarized as follows:

1. Environmental dynamism has a positive impact on business model innovation.
2. Environmental dynamism has a positive impact on strategic flexibility.
3. Strategic flexibility has a positive impact on business model innovation.
4. Strategic flexibility mediates the relationship between environmental dynamism and business model innovation.

In line with the theory, all four hypotheses were approved by the data. First, the test result on the direct effect of environmental dynamism on business model innovation revealed that while the magnitude of the effect was moderate, the variance in business model innovation due to environmental dynamism was small. This finding leads us to consider other possible factors (e.g. managers' initiatives (Cavalcante, 2014)) that would trigger business model innovation.

Additionally, coordination flexibility was found to be more weighted than resource flexibility in forming strategic flexibility while affecting business model innovation. Parallel with the critical capability mentioned in the literature, coordination flexibility is a crucial factor in complex innovation processes like business model innovation which directly or indirectly interact with many of the organizational divisions, processes, and structures.

Another finding is required to be noted that although the environmental dynamism effect on strategic flexibility was approved by the data, this study revealed a weak relationship. This result may also explain the contradictory conclusions about this causal relationship. This study's data approved the

effect however further investigations in other contexts or different research designs would contribute to create a robust literature.

Finally, the findings showed that the mediation effect of strategic flexibility increased the variance in business model innovation which improved the explanatory power from weak to moderate. In line with other recent research (Witschel et al., 2022), one explanation for this improvement could be that in dynamic environments, transformation activities to enable business model innovation can be driven by dynamic capabilities such as strategic flexibility.

Managerial implications

A couple of managerial implications can be derived from this study. First, managers need to remember external environment characteristics are an important factor for strategic management. Dynamic environments may nurture both opportunities and threads. Business model innovation is an important coping mechanism in dynamic environments. This study also confirms that firms innovate more their business models in high dynamic environments. Secondly, strategic flexibility is a dynamic capability to reallocate, reassign, or realign their resource base and processes to create strategic options to pace with dynamic environment. As a dynamic capability, strategic flexibility improves the possibilities of adopting business model innovations in dynamic environments. Managers should pay attention to invest in developing dynamic capabilities like strategic flexibility where this would be a necessity when the need for change in the business model occurs.

Limitations and Future Research

Despite its contributions, this study has limitations that should be addressed in future research. First, the results of this study are context-specific sample from Türkiye therefore they should be considered as tentative. To generalize the findings, future research is encouraged in other contexts. Second, using cross-sectional data may be insufficient for establishing proper causality. Future research could conduct different research designs like longitudinal to interpret the key issues more precisely and comprehensively. Finally, valid, and robust empirical analysis efforts were provided but still, this analysis can only be the first step into large-scale empirical research in this domain. The other drivers and consequences of business model innovation may also be tested in Türkiye context.

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