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Development and Validation of a Multidimensional Business Capabilities Measurement Instrument

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According to the theory of resource-based view, a firm's special capabilities are the main sources of its superior performance and competitive advantage. The effects of business capabilities on performance and competitive advantage have been tested by myriad research studies, but the various studies have lacked a commonly accepted measurement instrument that comprises all components of business capabilities. This study aims to fill this gap through conceptualizing and developing a multidimensional business capabilities measurement instrument. We established a scale incorporating seven dimensions of business capabilities that are compatible with operational functions. Data were then collected from 445 owners/executives of the manufacturing firms and analyzed through confirmatory factor analysis to assess validity and reliability. As a result, we have attempted to contribute to business executives and academics by providing a multidimensional business capabilities scale.

KEYWORDS business capabilities, confirmatory factor analysis, measurement instrument, organizational capabilities, resource-based view

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INTRODUCTION

There has been a major increase in the number of studies into the resource-based view (RBV) concept since the 1980s. Theorists of the RBV of the firm (Wernerfelt, 1984; Barney, 1991; Grant, 1991; Peteraf, 1993) argued that firms need to achieve competitive advantage to be able to respond to ever-changing market conditions by strategically deploying resources and capabilities within the firm and adding new capabilities to existing ones. In this respect, capabilities are defined as the collective skills, abilities, and expertise of a firm that play a strategically crucial role in acquiring competitive advantage.

Researchers have tested the relationship among capabilities, competitive advantage, business strategies, and business performance (e.g., Hitt & Ireland, 1986; Barney, 1991; Hall, 1993; Day, 1994; Celuch, Kasouf, & Peruvemba, 2002; Ray, Barney, & Muhanna, 2004). Although many studies have been made on the capabilities, we discovered that no measurement instrument covers all components of the capabilities we describe here. Existing studies were conducted independently and made use of various measurement instruments, leading to disparate results. Furthermore, most of the research involved one component of the capabilities while ignoring the others. Therefore, the aim of this study is to fill this gap through the conceptualizing and development of a business capabilities construct and the assessment of its validity and reliability. Component factors and key variables for the construct are identified through an extensive literature review. Confirmatory factor analysis (CFA) is performed using AMOS 16.0 to assess the construct and identify the model fitness.

We applied the standard methodology for the development of measurement scales in social sciences (Churchill, 1979; Llusar & Zornoza, 2002) to construct the measurement instrument. In general, the procedure that allows one to move from the concept to its measurement requires a four-stage process: literary definition of the concept, specification of dimensions, selection of observed indicators, and synthesis of indicators or elaboration of indexes.

To this end, this article is arranged in five parts. A literature review focusing on the concept of business capabilities follows this section. The main characteristics and the dimensions of the business capabilities are defined. In a third section, the applied methodology for the construction of the measurement instrument of business capabilities is described. This is followed by the evaluation of the measurement instrument by CFA and an examination of the reliability and validity of the scale. Finally, the conclusions are set out, together with some recommendations for future research.

LITERATURE REVIEW

Business Capabilities

Capabilities have attracted the attention of researchers and executives because of their role in determining the sources of a firm's superior performance and sustainable competitive advantage (e.g., Ulrich, 1987, 1989; Ulrich & Lake, 1991; Stalk, Evans, & Shulman, 1992; Hall, 1993; Day, 1994; Lado & Wilson, 1994; Celuch et al., 2002; DeSaa & Garcia, 2002; Kaleka, 2002; Ray et al., 2004; Ulrich & Smallwood, 2004; Vorhies & Morgan, 2005; Teece, 2007). The intellectual root of this theory dates back to Schumpeter (1942) and Penrose (1959). Penrose (1959) emphasized the importance of viewing a firm as the sum of physical and human resources. This assertion can validly be called the starting point of the RBV of the firm. Penrose also emphasized that a firm should seek to accumulate both tangible and intangible resources to ensure the growth of the business.

The theory of RBV defines capabilities as a bundle of skills and the knowledge that is strategically important to manage assets and coordinate activities effectively (Rumelt, 1984; Wernerfelt, 1984; Barney, 1991; Hall, 1993; Day, 1994; Helfat & Peteraf, 2003). However, some researchers defined the capabilities as the use of the tangible or intangible resources of a firm for the performance of a duty or action leading to the enhancement of business performance, expressing through this view the dynamism of a firm's pool of resources (Amit & Schoemaker, 1993; Teece, Pisano, & Shuen, 1997). Firm-specific capabilities that stem from business processes and applications and that are learned through repetition are usually difficult for competitors to imitate (Dierickx & Cool, 1989; Grant, 1991). The literature suggests that firms differ based on their capabilities (Hitt & Ireland, 1986; Dierickx & Cool, 1989; Barney, 1991; Peteraf, 1993) and that the ability to develop effective capabilities is a firm's main source of competitive advantage and performance (Hall, 1993; Teece et al., 1997; DeSarbo, DiBenedetto, Jedidi, & Song, 2006). For this reason, the firm should diversify its capabilities and deploy them strategically, leading to greater efficiency and higher performance. In other words, the firms or SBUs that developed and managed their resources and capabilities better than their rivals would achieve superior performance (Hitt & Ireland, 1986). In summary, a business capability, sourced from the resource base of an organization, expresses the ability of a firm to perform coordinated and usual tasks in order to achieve specific goals (Grant, 1991; Amit & Schoemaker, 1993; Teece et al., 1997; Helfat & Peteraf, 2003). This definition of the business capability is used throughout this article. In this definition, the concept of "usual" refers to "the actions performed on repetition."

The Dimensions of Business Capabilities

As noted above, business capabilities are increasingly important to executives and researchers who recognize their vital role in creating and sustaining a firm's competitive advantage. With this growing interest, many different classifications have been proposed for the determination of components or categories of the capabilities.

The most prominent and widely used of these classification efforts is the one made by functional areas of the firms. Adopting this approach, Grant (1991) stated that it would be useful to take as a basis for classification of the capabilities the standard classification of business functions. Researchers taking this approach have manifested different components of business capabilities. With the vast effect of technological change on the global business environment, some components of capabilities have merged or become moribund and others have come into existence.

In defining the dimensions of the capabilities we benefited from the classification by existing literature of operational functions compatible with the changing conditions of the current business environment. In this regard, studies made by Snow and Hrebiniak (1980), Birchall and Tovstiga (1999), and Celuch et al. (2002) are noticeable empirical examples for classification of the operational capabilities by the functional areas. In addition, several strategic management books (e.g., Hitt, Ireland, & Hoskisson, 1999; Sadler, 2003) replaced business capabilities by classifying them in the order of their functional areas. The summary of these studies are depicted in Table 1.

In this study, the classification of the capabilities is compatible with the operational functions and the business capabilities are divided into categories as in the preliminary studies made for identification of the dimensions of the business capabilities. After scanning the related literature we conducted interviews with corporate executives to decide upon the subdimensions of business capabilities. We then discussed the dimensions of the business capabilities with academics who are experts on business administration. In light of this information based on literature scanning and interviews with the corporate executives, we modified the dimensions of business capabilities found in those previous studies that acted as guides for this study (e.g., Porter, 1980; Celuch et al., 2002). After the modifications, we decided to incorporate *management, production, marketing and sales, information systems, learning, logistics* and *external relationship* capabilities in our study. The dimensions of the capabilities are described below.

Recent studies indicated the growing importance of marketing capabilities for business organizations (Celuch et al., 2002, Spillan & Parnell, 2006) in the globalized era, distinguished by rapid changes and complexity (Drucker, 1999, pp. 73–75). The most important effect of globalization is that it creates greater threats, but also greater opportunities for businesses. The threats are generated by a more variable environment and increased competition, and

TABLE 1 Business Capability Components in the Selected Literature

Snow & Hrebiniak 1980	Birchall & Tovstiga 1999	Hitt et al. 1999	Celuch et al. 2002	Sadler 2003
Financial management			Globalization	Corporate
General management	Management	Management	Upper management	
Personnel		Human resource management		Human resource management
Marketing and sales	Marketing Sales	Marketing	Marketing and sales	Marketing Sales and distribution
Distribution		Distribution		
			Order fulfillment	
Product research and development		Research and development		
Engineering	Engineering		Technological	Design
Production	Operations	Production	Product/ Service	Operations
Regulatory affairs				
		Management information systems	Information system	Management information systems
			External relationship	

opportunity is generated by increased growth of the markets. These changes hasten more change. (Kotter, 1998, p. 164). In such a global business environment, the marketing and sales forces of a firm take over the burden of the firm's survival. At this point, organizations that have fallen away from their core capabilities must make careful strategic decisions regarding future specialization by means of systematic market analyses. Marketing and sales forces are required to analyze the market thoroughly and provide top management with the necessary flow of information that will enable them to find correct solutions. Consequently, the marketing and sales capabilities, usually placed in the same functional department, are included in the study as a critical capability. Abilities such as promotion, sale power, market analysis, and customer selection were combined as *marketing and sales capabilities*.

Every firm has some work processes to present a value to the customers. The competitive success of the company depends on its ability to transform key processes to strategic skills that continuously supply the customers with superior values. Thus, companies should build up their technological capabilities by making strategic investments in a supporting substructure that includes strategic workforces and functions. In this context, technological

capabilities containing product/service and product processing, and research-development capabilities including product quality and after-sale service capabilities were dealt with as a whole. Thus, this function was configured as *production capability* by combining the manufacturing and product development processes. Actually, in the manufacturing industry, these processes are related but independent of each other and traditionally include all production activities.

The operations are classified as order fulfillment and distribution capabilities by focusing on the delivery lead time and production volume flexibility as two critical items for the customers, who are in need of just-in-time inventory management for the occasionally irregular production activity diagrams. The order fulfillment capabilities (Celuch et al., 2002) including the distribution matters and variables of after-sale service of product and service capabilities that are separate from each other are considered together as they are involved with the operating activities performed after production and sale. This configuration represents the operating logistics with the lack of warehousing. For this reason, the variables related to the warehousing abilities were inserted with a view to configured *logistics capabilities* components. In addition, these configurations also match the business functions.

In order to achieve competitive advantage based on capabilities, it is necessary to accumulate, combine, exploit, and enrich resources (Grant, 1991; Sirmon, Hitt, & Ireland, 2007), and to transform them into a business capability. However, a business capability does not require all resources and abilities to be internal, but rather to maintain control of key business resources, processes, and abilities (Stalk et al., 1992). Furthermore, RBV suggests that these resources must be valuable, rare, inimitable, and, non-substitutable (Barney, 1991). At this point, managers transform resources to business capabilities by selecting the key business resources, deciding upon strategic preferences for achievement of basic and special objectives, and bringing together a great number of works, functions, and personnel experience (Eisenhardt & Martin, 2000; Celuch et al., 2002). These managerial capabilities also include leadership, vision, and planning. Recently Molina, del Pino, & Rodrigez (2004) and Sirmon et al. (2007) made contributions to the literature that managerial capabilities play significant role on firms' competitiveness by executives in the strategic decision process. In addition, some researchers (Penrose, 1959; Bartness & Cerny, 1993; Castanias & Helfat, 1991, 2001) have emphasized the role of managers and entrepreneurship in creating value driven by capabilities. They have argued that managerial capability is the source of a firm's competitive advantage and business performance. Thus, in our study, management skills are configured as *management capabilities* so as to reflect the importance of corporate leaders and include the matters of leadership, vision, and planning.

In addition to the classifications of Birchall and Tovstiga (1999), new categories of capability, reflecting pressure on the supply chain, have also

been incorporated into the study. First, reflecting the increasing importance of information technology—data exchange and financial and operational reporting—*information systems capability* has been included as a distinct capability. This approach follows that of Moore (2000), who argued that information technology should be seen as a line, not a staff function, and Celuch et al. (2002) who consider information systems capability as a distinct capability. It is clear that the increasing importance of market research and B2B (business to business) electronic marketing make *information systems capability* a critical capability.

Recognizing market opportunities is very important toward appropriate positioning in order to achieve competitive advantage. This requires specific knowledge, creative activity, and the ability to understand user/customer decision making and practical wisdom (Nonaka & Toyama, 2007). Because of those requirements, the ability to recognize opportunities depends in part on the individual's learning capabilities and extant knowledge (Teece, 2007). Learning is defined as a permanent change in behavior as a result of repetition and experience, leading to the ability to perform tasks better and quicker (Teece et al., 1997). From the business capabilities viewpoint, business organizations acquire several benefits from learning by repetition and making these repetitions into valuable, rare, inimitable, and nonsubstitutable routine procedures. Learning by repetition and experience of business processes can turn resources into capabilities and convert the information into permanent organizational knowledge. Thus firms continuously learn and build knowledge (Sirmon et al., 2007). We have thus incorporated *learning capability* into our study, which does not occur in the capabilities classification made by Snow and Hrebiniak (1980), Birchall and Tovstiga (1999), and Celuch et al. (2002).

Finally, following the studies of Liedtka (1996) and Celuch et al. (2002), external *partnership capabilities* has been included in the study as a distinct component of capability. This has effects on the organization's capability to develop new skills through building external relations and development capability. Since organizations develop parts as a result of working with customer firms, external partnership is a critical capability ensuring that sellers create maximum value for customers (Celuch et al., 2002). Furthermore, building long-term relationships with suppliers and customers is generally accepted as a fundamental principle of quality.

Firm-specific human capital can create competitive advantages. Because this human capital is costly to imitate, such advantage can be sustained (Hatch & Dyer, 2004). Human resources ensure the best processing of an organization's resources to transform each of them to a business capability. Thus, human resources are taken into consideration as critical contributors to competitive advantage, as illustrated by the outstanding rise of RBV in the field of strategic management. Previous studies (Huselid, 1995; Huselid, Jackson, & Schuler, 1997; DeSaa & Garcia, 2002) have shown that high

human resource performance improves the abilities and motivation of employees and has a relationship with operational performance. However, this relationship showed relatively weaker results statistically. Researchers have noticed that human resources play a catalyzing role needed to create a capability from resources of a firm. Thus it should be said that human resource is a critical component of any firm's cabability. For these reasons, human resource management capability has not been included in this study.

In this study, we incorporated seven dimensions of business capabilities to develop a single multidimensional measurement instrument as described above. Although the business capabilities construct is conceptualized as consisting of seven distinct components, the covariance among the items can be accounted for by a single business capabilities factor. Therefore those seven subdimensions should be merged in a single business capabilities construct. The above seven dimensions are interlinked while describing the concept of business capabilities, and the functions of the organizations should work together in synergy to achieve the organization's basic objectives.

METHODOLOGY

Item Selection, Data Collection and Sample Characteristics

The scale development procedure was conducted in seven stages: (1) literary definition of the concept; (2) identifications of dimensions; (3) generation of items; (4) reduction of the scale; (5) pretest of the scale; (6) collection of data; and (7) measurement evaluation. After defining the business capabilities concept, we conceptualized seven dimensions of business capabilities through interviews with academics interested in strategic management and 45 corporate executives, each having an MBA degree and ten years' minimum experience. In the items generation stage, the items related to business capabilities used recent studies (e.g., Lee, 2001; Celuch et al., 2002; Kaleka, 2002; Rosenzweigh, 2003; Lu & Yang, 2006). These were combined in the draft questionnaire through a comprehensive literature review. All questions were subjected to the "translate, reverse translate" procedure by the experts of both languages (Brislin, 1970). The draft questionnaire form was reviewed and the numbers of variables were reduced by interviews with the same academics and corporate executives. Furthermore, we discussed possible semantic shifts and awkwardness of expression with the executives participating in the preliminary test stage of our study, to determine any semantic shift or bad expression. Consequently, a total of 43 items included in seven dimensions were generated from the literature (see Appendix). The questionnaire uses a seven-point Likert scale.

The survey was conducted in the Marmara Region of Turkey; the most developed industrial region. A sample of 500 medium- and large-sized manufacturing firms was chosen randomly from the database of the Istanbul

TABLE 2 Descriptive Statistics of the Sample

Level of managers	Corporate owner (8.6 %)	Top executives (21.2%)	Medium level (70.2%)
Education Level	Post graduate (27.7%)	Graduate (57.8%)	Undergraduate (14.5%)
Industries	Metal (13.5%)	Automotive (12.1%)	Machinery/Metal Goods (9.2%)
	Food (8.8%)	Stone-Soil Related (8.3%)	Textile (7.2%)
	Chemicals (5.8%)	Office Materials and Electronics (5.6%)	Various (29.5%)

Chamber of Commerce. The questionnaires were sent to the owners and executives with a cover letter. A total of 466 completed questionnaires were received from 190 firms. Response rate is 39.8% in firm level. Most of the participant firms described themselves in international scope (95.4%). We compared early and late respondents to evaluate the nonresponse bias. No significant differences were found between early and late respondents on all variables. After the elimination of some questionnaires because of data hiding and single response from a firm, 445 clear questionnaires were taken to the analysis stage. A comparison was made between the eliminated questionnaires and those chosen for analysis in terms of means, firm size, and firm age, and no statistical difference was found among them. Descriptive statistics of the sample are shown in Table 2.

Analysis for Measurement Validity and Reliability

In RBV literature, there exists no commonly accepted measurement instrument with respect to business capabilities. Thus, in order to assess the construct validity and the reliability of the scale developed in this article, the following analyses suggested by Bagozzi and Phillips (1982) were considered: content validity, reliability, unidimensionality, convergent validity, and discriminant validity.

Content validity is a concept related to the expressions that constitute the scale. It represents the degree to which a measurement tool covers the domain of variables being measured. Consensus among experts indicates these items cover the objects of our study and the matters to be measured, indicating the content validity of the scale. Reliability indicates that the measures are free of any random errors and measure the construct in a consistent manner. Unidimensionality, one of the most basic assumptions in the measurement theory, is the degree to which items represent one and only one underlying latent variable (Garver & Mentzer, 1999). Convergent validity concerns the extent of consistency between applications made by distinct methods for the same purpose (Rao, Solis, & Raghunathan, 1999; Llusar &

Zornoza, 2002). Discriminant validity indicates that the dimensions should differ from each other distinctly and independently (Bagozzi & Phillips, 1991). In other words, the construct should yield different results when measuring different variables.

The measurement instrument we have developed is based first on the literature, and its components and items were then reviewed by conducting interviews with corporate managers and academics. The qualitative results have clearly demonstrated that the measurement instrument has content validity. In addition, a pretest has been conducted. These procedures ensured that the components and items were accurate and consistent with the terminology. We now move forward to the analysis of other validity and reliability indices.

In the first stage of the analysis, all the existing 43 variables were included in order to form a cabapilities scale. For scale reliability, we first referred to the Cronbach's alpha coefficient. The result of alpha tests showed that the reliability scores were high, at 0.974, and none of the items exceeded alpha coefficient. We also looked at the corrected interitem correlations and found that all of the resulting values were 0.500 and above.

The application of principal component analysis (PCA) allows the reduction of the proposed instrument dimensionality, and varimax rotation method maximizes the sum of variances of required loadings of the factor matrix (Hair, Anderson, Tatham, & Black, 1998). Therefore PCA with varimax rotation was applied on the set of 43 variables to identify key business capability factors having eigenvalues greater than one. In the data reduction procedure those variables having a factor load of 0.500 and above were taken into account. At this stage, the variables BC14 and BC19, not included in any factor, were excluded from the scale. Seven basic components of business capabilities were obtained as a result of PCA. Table 3 provides the principal component scores, item-to-total correlations, squared multiple correlation, and the coefficient alpha for construct. As can be seen, the final scales illustrate reliability and internal consistency; resulting indicants contain high principal component coefficients and reliabilities. According to the PCA findings, the factor-loading scores of the items were between 0.516 and 0.791. All 41 items separated to their estimated factorial components without any cross-loading, which shows us that the measurement instrument has unidimensionality. Moreover, each group of items has been conducted to PCA procedure according to their respective factors and the results have demonstrated the scales have discriminant validity.

Structural equation modeling (SEM) is a powerful statistical technique that combines the measurement model (confirmatory factor analysis) and the structural model (regression or path analysis) into a simultaneous statistical test (Bagozzi, 1981b). CFA makes this technique ideal for refining and testing construct validity (Bollen, 1989). CFA evaluates the factors' psychometric properties in term of reliability and validity. This is the well-known

statistical procedure used for testing the fitness of the structures with the factorial component (Byrne, 2001; Schumacher & Lomax, 2004). CFA is employed in this research by using the maximum likelihood (ML) estimation method. The most fundamental assumption in multivariate analysis and also in ML method is normality. We used the Kolmogorov-Smirnov test to examine the level of significance for the differences from a normal distribution. We found all of the Z values of the variables were calculated over the 3.107 ($p < 0.001$) as a result of the Kolmogorov-Smirnov test. This result is evidence of the normality of the distribution.

Overall model fit was evaluated based on multiple fit indexes; absolute fit, incremental fit, and parsimonious fit (Hair et al., 1998). In this study the goodness of fit index (GFI) and the root mean square residual of approximation (RMSEA) were used to evaluate the absolute fit. The GFI indicates relative amounts of variance and covariance described in the data set that is jointly accounted for by the model. GFI ranges from 0 to 1 with 1 meaning perfect fit (Byrne, 2001). Although higher values indicate more powerful fitness (Rao et al., 1999) there is no consensus on the threshold of GFI because of its relative independence of the sample size. Many researchers interpret GFI score between the 0.80−0.89 range as representing a reasonable fit and, when measured above 0.90 it is evidence of a good fit (Chau, 1997). RMSEA provides information about fitness of the observations with the model. It is expected that RMSEA should be no lower than 0.08.

Researchers use multiple fit indexes to evaluate incremental fit. Comparative fit index (CFI) indicates fitness of the tested model and assumed model with each other (Bentler, 1990). Normed fit index (NFI), Tucker-Lewis Index (TLI), and incremental fit index (IFI) evaluate the degree of freedom of the evaluated model relative to the initial model (Bentler & Bonett, 1980). If all these indexes (CFI, NFI, TLI, and IFI) are above 0.90, it indicates that the model is ideal and findings give excellent results (Hair et al., 1998).

The chi-square/degree of freedom (x^2/df) statistic evaluates the parsimonious fit of the model by measuring the difference between covariance of the sample and fitted models. When the ratio of chi-square to the degree of freedom ranges between 2 and 5, it indicates that null model and data are appropriate with each other (Marsh & Hocevar, 1985). However, sensitivity to the sample size and deviation from multivariate normality are disadvantages of the chi-square test. For this reason, it is recommended that this index should be read carefully (Chau, 1997; Rao et al., 1999).

The following findings were obtained as a result of the fit analysis of the initial model as a result of the principal component analysis: $x^2/df = 2.814$, GFI = 0.799, CFI = 0.901, NFI = 0.855, TLI = 0.893, IFI = 0.902, and RMSEA = 0.063. These findings indicate that the initial model needed to be respecified to fit better with the sample data. The following modifications were made to improve the model.

TABLE 3 The Results of Principal Factor Analysis

	Item-to-item correlation	Squared multiple correlation	Management	Manufacturing	Marketing & sales	Information systems	Learning	Logistics	External relationship
Cap01	.650	.697	0.779						
Cap02	.665	.753	0.791						
Cap03	.666	.668	0.735						
Cap04	.714	.715	0.700						
Cap05	.689	.641	0.661						
Cap06	.664	.640	0.629						
Cap07	.618	.599		0.587					
Cap08	.642	.652		0.603					
Cap09	.680	.682		0.677					
Cap10	.639	.656		0.671					
Cap11	.680	.707		0.694					
Cap12	.691	.697		0.635					
Cap13	.607	.596		0.626					
Cap15	.607	.592			0.730				
Cap16	.696	.722			0.728				
Cap17	.708	.684			0.645				
Cap18	.718	.679			0.567				
Cap20	.683	.695				0.698			
Cap21	.654	.710				0.736			
Cap22	.672	.684				0.741			
Cap23	.649	.589				0.677			

Cap24	.738	.678	0.576		
Cap25	.741	.725	0.668		
Cap26	.723	.692	0.655		
Cap27	.742	.686	0.638		
Cap28	.735	.642	0.550		
Cap29	.691	.636	0.618		
Cap30	.692	.659	0.593		
Cap31	.745	.661	0.552		
Cap32	.685	.621	0.516		
Cap33	.653	.609		0.665	
Cap34	.529	.505		0.753	
Cap35	.586	.562		0.710	
Cap36	.690	.622		0.596	
Cap37	.640	.594		0.606	
Cap38	.643	.636		0.664	
Cap39	.656	.661		0.670	
Cap40	.618	.579			0.658
Cap41	.701	.739			0.732
Cap42	.708	.736			0.680
Cap43	.662	.687			0.688

F: 35.358 ($p = 0.000$); KMO: 963; Cronbach's alpha: 973; Total variance explained: 69.76%.

TABLE 4 Results of the First Order CFA

	1	2	3	4	5	6	7
Management	–	*0.666*	*0.719*	*0.612*	*0.777*	*0.615*	*0.635*
BC01	.805						
BC02	.840 (20.487)						
BC03	.814 (19.617)						
BC04	.850 (20.831)						
BC05	.793 (19.910)						
BC06	.763 (17.966)						
Manufacturing	–	–	*0.691*	*0.684*	*0.743*	*0.644*	*0.616*
BC09		.711					
BC10		.828 (16.474)					
BC11		.857 (16.994)					
BC12		.838 (16.654)					
Marketing and Sales	–	–	–	*0.669*	*0.762*	*0.730*	*0.640*
BC15			.732				
BC16			.846 (17.532)				
BC17			.845 (17.507)				
BC18			.821 (17.012)				
Information Systems	–	–	–	–	*0.738*	*0.681*	*0.600*
BC20				.842			
BC21				.853 (21.859)			
BC22				.839 (21.308)			
BC23				.761 (18.459)			

Learning	–	–	–	–	–	*0.762*	*0.766*
BC24					.782		
BC25					.812 (19.023)		
BC26					.791 (18.383)		
BC27					.815 (19.092)		
BC28					.785 (18.200)		
BC29					.765 (17.609)		
BC30					.752 (17.243)		
BC31					.791 (18.381)		
BC32					.734 (16.741)		
Logistics	–	–	–	–	–	–	*0.767*
BC33						.739	
BC35						.707 (14.695)	
BC36						.784 (16.410)	
BC37						.724 (15.090)	
BC38						.776 (16.236)	
BC39						.798 (16.723)	
External Relationship	–	–	–	–	–	–	–
BC40							.725
BC41							.858 (17.702)
BC42							.882 (18.167)
BC43							.829 (17.098)

The factor loadings of all items were significant and their scores were between 0.673 and 0.881. Upon examination of the errors variance, out of 41 variables, no variance was seen to have high scores. While examining modification indexes we recognized large error covariance between some variables. In order to determine these variables, we referred to the multiple square roots of the multiple correlations and regression weights. As individual examination of each pair of variables, the items Cap07 (0.453; 0.673), Cap08 (0.457; 0.676), Cap13 (0.498; 0.705) and Cap34 (0.487; 0.698) were deleted because of the poor values of square multiple correlations and regression weight scores.

Following the above steps, by leaving four more variables off-scale, the scale was reduced to 37 variables. Regression weights of the variables in the adjusted model with 37 variables are between 0.705 and 0.882. Model fit indexes were found as $x^2/df = 2.620$, GFI = 0.829, CFI = 0.922, NFI = 0.880, TLI = 0.914, IFI = 0.922, and RMSEA = 0.060. No large error variances were found among the variables of first adjusted model.

The first order CFA shows us all variables were loaded on their respective factors. Factor-loading values, critical ratios, and correlation values between factorial components have been depicted in Table 4. The critical ratios above 3.107 mean that the regression weight is statistically significant ($p < 0.001$). The result of the first order CFA shows that our model has configured from 7 factorial component and correlations among these latent factors are significant ($p < 0.001$) as expected.

After first-order CFA, a secondary CFA was conducted to prove construct reliability. As can be seen in Table 5 all 37 items in the adjusted model consist of seven factors loaded onto their respective subfactors, without any cross-loading. All the factor-loading scores of the dimensions (0.792–0.929) and items (0.707–0.882) took up values high and close to each other ($p < 0.001$). The result of the close factorial loading onto business capabilities construct after second-order CFA has giving evidence for convergent validity. The model fit indexes have given sufficient results: $x^2/df = 2.662$, GFI = 0.824, CFI = 0.918, NFI = 0.875, TLI = 0.912, IFI = 0.918, and RMSEA = 0.061.

TABLE 5 Results of the Second Order Factor Loadings

Components	Factor loadings	1	2	3	4	5	6	7
1. Management	0.810	1	0.666*	0.719*	0.612*	0.777*	0.615*	0.635*
2. Manufacturing	0.803 (12.146)		1	0.691*	0.684*	0.742*	0.644*	0.616*
3. Marketing and Sales	0.840 (12.897)			1	0.669*	0.762*	0.730*	0.640*
4. Information Systems	0.792 (13.571)				1	0.738*	0.681*	0.600*
5. Learning	0.929 (14.585)					1	0.762*	0.766*
6. Logistics	0.837 (12.905)						1	0.767*
7. External Relationship	0.809 (12.461)							1

*$p < 0.001$.

TABLE 6 Reliability Coefficients of the Final Model Obtained Upon the Second Order CFA

	Correlations between the adjusted values	Squared multiple correlations	Cronbach's alpha
Management	0.735	0.579	0.911
Manufacturing	0.736	0.553	0.911
Marketing and Sales	0.760	0.585	0.908
Information Systems	0.722	0.544	0.912
Learning	0.853	0.736	0.900
Logistics	0.759	0.611	0.908
External Relationship	0.729	0.591	0.911

0.061. All variables have significantly loaded to the respective factor. Table 5 shows the result of the second-order CFA.

Another operation that should be performed in order to prove statistical validity of the business capabilities measurement instrument is comparison of the internal validity of the initial and last model. The Cronbach's alpha coefficient of the obtained model was found as $\alpha = 0.921$. Then we examined the correlations between the adjusted values and squared multiple correlations and the alpha coefficient of the factorial components to evaluate internal validity. These reliability coefficients of the model obtained as a result of second order CFA are given in Table 6.

The fit values of the final model obtained after the last adjustment are sufficient and close to the results of first order CFA. These findings prove the fitness of the model. The comparison between the fit indexes of the models obtained during the study is shown in the Table 7. It can be seen from the table that the test results of every model are very close to each other. The slight differences between model fit indexes stem from the differences of the degree of freedom coefficients of the models.

The last step necessary for statistically providing scale reliability is to evaluate the reliability coefficient of the final model. Scale reliability provides a measure of the internal consistency and homogeneity of the items comprising the scale (Churchill, 1979). The internal reliability coefficient of the final model was found as $\alpha = 0.971$. However, alpha coefficient does not ensure the unidimensionality but instead assumes it exists (Hair et al., 1998,

TABLE 7 Comparison of Model Fit Indexes

Process	Model	Description	x^2/df	GFI	CFI	NFI	TLI	IFI	RMSEA
First-Order CFA	1	41 Variables, 7 Dimensions	2.814	0.799	0.901	0.855	0.893	0.902	0.063
	2	37 Variables, 7 Dimensions	2.620	0.829	0.922	0.880	0.914	0.922	0.060
Second-Order CFA	3	37 Variables, 7 Dimensions	2.662	0.824	0.918	0.875	0.912	0.918	0.061

p. 611). Thus researchers (e.g., Werts, Linn, & Joreskog, 1974; Fornell & Larcker, 1981; Rao et al., 1999) use an alternative composite reliability (p_c) (Werts et al., 1974) coefficient because of insufficiency of the Cronbach's alpha coefficient to assess the reliability and unidimensionality of the measurement instrument. Composite reliability shows the degree to which the observed variables adequately represent the corresponding latent variable. However Bagozzi and Yi (1988) suggested 0.70 as a challenging threshold; when p_c exceed 0.50 it implies that the variance captured by the factor is more than captured by the error components (Bagozzi, 1981a; Hair et al., 1998, p. 612). Bagozzi (1981a) and Werts et al. (1974) suggested using Werts-Linn-Joreskog and Cronbach's alpha coefficients to assess the reliability of the measurement instrument together, because of the similarity between them. Our measurement instrument's composite reliability coefficient has been calculated as $p_c = 0.949$. This value indicates goodness of the construct reliability.

When internal validity coefficients (see Table 6) and model fit indexes (see Table 7) pertaining to the final model obtained above are evaluated together, it is seen that the correlation coefficients between the adjusted variables of each dimensions are more than 0.300 and alpha value more than 0.60 (Churchill, 1979). It is also seen that none of the multiple correlation coefficients of the dimensions disturb the model. All the values obtained are above the acceptability level recommended by Price and Mueller (1986) for the scale development. The reliability coefficients of the scale are both Cronbach's alpha and Werts-Linn-Joreskog and supports acceptability of the scale having 37 items and 7 dimensions as a measurement instrument of the business capabilities.

Above statistics show that 37 items of the business capabilities measurement construct are partitioned into seven distinct factors as suggested in the conceptualizing the stage of the construct. In addition, those 37 items converged into a single business capabilities construct through seven latent variables. These dimensions are significantly related to each other. These findings proved that these dimensions chosen related with the business functions are the subdimensions of the business capabilities and constitute single multidimensional business capabilities construct. Thus, a seven-dimensional business capabilities construct was accepted as a single measurement instrument. The final model showing all results of the CFA is depicted in Figure 1.

DISCUSSION AND CONCLUSION

This article focused on the development of a multidimensional measurement instrument for business capabilities. We have discussed a detailed process for researchers and academics working with RBV to test for construct validity and the reliability of a business capabilities construct. At each step in the process, techniques and acceptable standards were discussed.

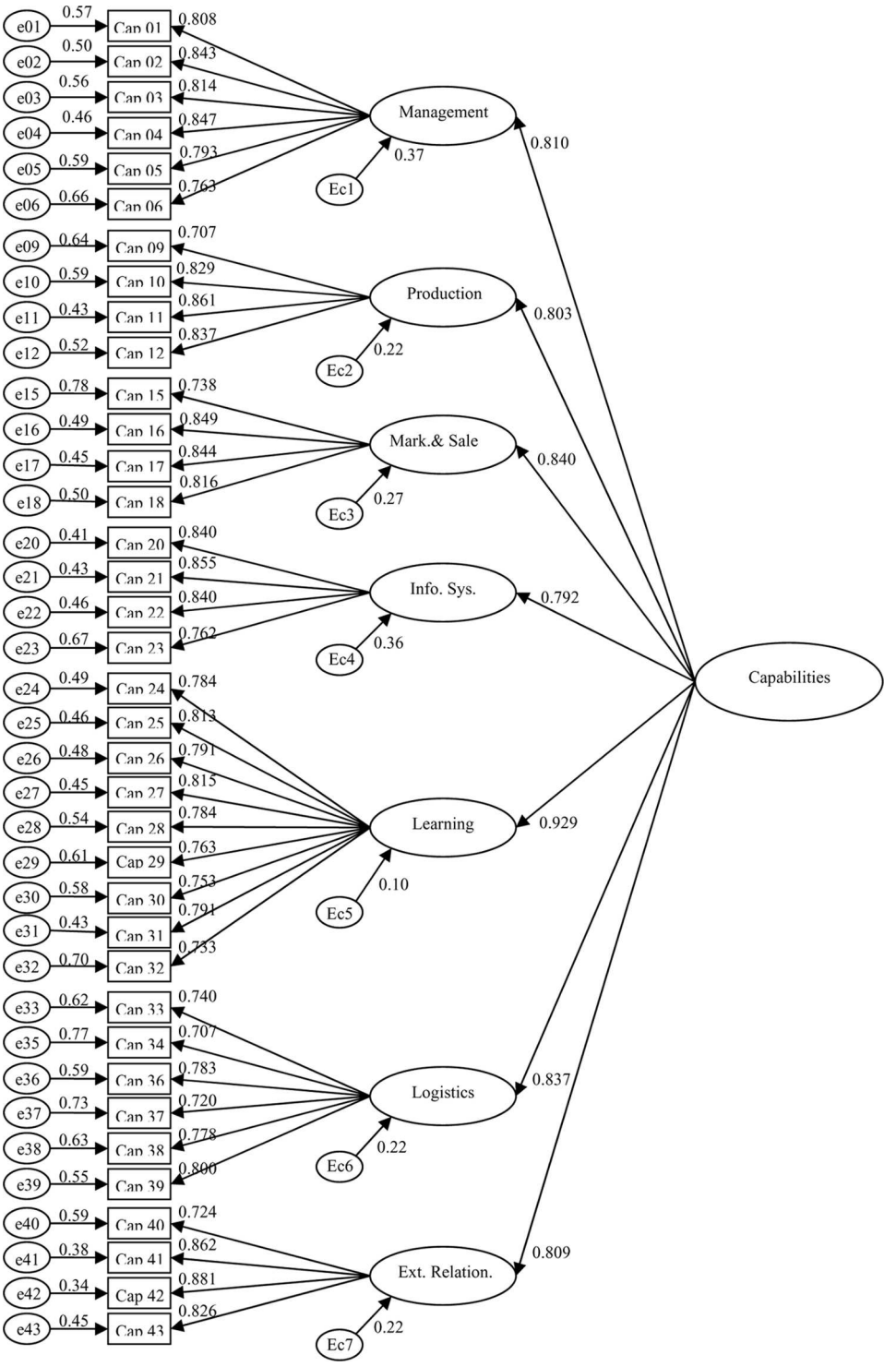

FIGURE 1 Final model of multidimensional business capabilities construct.

For the development of a multidimensional scale of business capabilities the dimensions were selected in accordance with the operational business functions. This selection was made by interviews with the academics interested in strategic management and owners or executives of the 45 firms each having a MBA degree and a minimum of ten years of experience. Variables were generated by using items related to our study, which were used independently in advance and empirically tested. To check the validity of the variables used in the research model, factor analyses were used. First of all, principal component analysis of dimensions was applied, and it was found that all of the variables loaded in groups to separate dimensions. This finding indicated unidimensionality of the model. CFA showed that each subdimension was charged to a single business capabilities factor, so the model has convergent validity. Correlation analysis, which showed that the extended variables of each factor are above the squares of other factor loadings, indicates that there is discriminant validity. Furthermore, that the alpha coefficient of the whole scale and each dimension of it are above 0.90 proves the reliability of the scale.

This study is inspired by the fact that although many studies are made on RBV, these studies are not related to each other and there exists no commonly recognized measurement instrument. Furthermore, most of the researchers focused on one or more specific resources or capabilities. However, operations focusing on only one or several operating resources or capabilities cannot achieve the desired performance: there is a need to create synergy by coordinating all resources and capabilities to achieve a single purpose. As can be seen in the results of the second-order factor analysis, seven different subdimensions of the business capabilities measurement construct converge on a single second-order factor. This finding and the ability to measure different capabilities is evidence of the coordinated and cooperated synergy of the capabilities.

The factorial components of our model are potential capabilities of a business, which may appear as a result of the coordinated and usual activities performed by the employees of an organization, and which otherwise would not show up. Examination of the correlation coefficients between the factorial components in Table 5 shows that the learning capability is correlated with all other capability dimensions with high coefficient. This indicates that the capabilities created from the operational resources and each existing as potential is based on learning and repetition.

Consequently, this study is only a small step as an empirical test of the business capabilities of RBV. The measurement instrument developed as a result of this study has given to RBV an integrated scale containing seven dimensions of the business capabilities. However our survey was conducted only in Marmara Region of Turkey, the most developed sociocultural and industrial region of Turkey. Notwithstanding, great care was shown for appropriateness of the variables to global business culture to overcome this

research limitation. This measurement instrument can be used by executives and consultants in their decision process to determine which existing capabilities to invest in, and by the researchers who desire to empirically test which capabilities based on the organizational resources of a certain industry create superior performance. Furthermore, we hope this measurement instrument may be tested cross-culturally by academics to further develop it for contribution to RBV literature.

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APPENDIX

The Items of Multidimensional Business Capabilities Measurement Instrument

Management Capability

1. Leadership abilities of firm's upper management team
2. The degree of sharing our firm's vision among employees
3. Strategic planning ability of our firm's upper management team
4. Our leaders' understanding of changes in the external environment
5. Our leaders' technical capabilities regarding our activities
6. The degree of internal and external relationship ability of our executives

Production Capability

7. Quality superiority of our products
8. Reliability of our guaranty systems for our products
9. Use of modern technology in our products
10. New product development
11. Improvement/modification of existing products
12. Adoption of new methods and ideas in the production/manufacturing process
13. Using new, advanced, and modern technology equipment in the production process
14. Our leaders' technical capabilities regarding our activities

Marketing and Sales Capability

15. Performance of promotion strategies by our firm in spite of others (i.e., sellers, agents, importers)
16. Extent of systematic analysis when selecting market
17. The strength of our sales and marketing forces
18. Our ability to respond to changes in the target market conditions
19. The degree of after-sale service ability to ensure our sale success

Information System Capability

20. Degree of attaining, analyzing, and using required information with IT
21. Using information systems and electronic data interchange capability
22. Capturing important market information and making contact with both domestic and global markets
23. Financial and operational reporting capability with using information system tools

Learning Capability

24. The ability to discover challenges and opportunities in external and internal environments
25. The ability to create new ideas to deal with the discovered challenges and opportunities in external and internal environments

26. The ability to make feasible and optimal choices among various alternatives to deal with the discovered challenges and opportunities in external and internal environments
27. The ability to execute, apply, and realize new ideas and knowledge to deal with the discovered challenges and opportunities in external and internal environments
28. The ability to transfer useful ideas, experience, lessons, knowledge, and practices originating in one place to relevant places within the organization
29. The ability to evaluate, seek feedback, review and reflect on the work already finished, and mine knowledge from past experience.
30. The ability to identify, acquire, and absorb necessary knowledge from the external environment
31. The ability to identify and contribute meaningful knowledge to the external environment
32. The ability to identify, capture, accumulate, codify, classify, store, and retrieve knowledge and expertise

Logistics Capability

33. Delivery lead time speed and reliability
34. The ability to minimize the cost of distribution
35. Flexibility on operational procedures and on volume and mix change depending on demand
36. Presale customer service management system
37. Speed of resolving and removing customer complaints
38. Ability to solve logistics and warehousing complications
39. Ability of service flexibility in meeting customers' needs

External Relationship Capability

40. Developing and sustaining long-term relationships with customers and suppliers
41. The degree of mutual understanding of business objectives and processes with our partners
42. The degree of sharing benefit and risk in the process of business with our partners
43. The degree of compatibility of our culture and policies in the process of business with our partners