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THE RELATIONSHIP BETWEEN INDIVIDUAL INNOVATIVENESS AND AGILITY

Osman Yildirim[1] and Ozay Cebeci[2]
[1]Istanbul Arel University, Tepekent Campus, Istanbul, Turkey
[2]Istanbul Aydin University, Florya Campus, Istanbul, Turkey

ABSTRACT

This research aims to examine the relations between innovativeness and agility. The study was carried out within the scope of mid-level and top managers in medium-sized SME that operate in manufacturing sectors. The results of the research show that managers need to take into account individual innovativeness in a critically fierce global competitive environment in order to bring advantage by making their enterprises agile. Structural validity and reliability analyzes of the scales used in the research were statistically tested. According to the hierarchical regression analysis, there is no statistically significant effect of the independent variables (F1, IN, OE, RT), sex and age on the agility variable. Only the independent variables F2, RC and OL were found to be effective. With this model, Agility variance can be explained by 30.7%. The F2 and RC independent variables positively affect the Agility dependent variable. Agility dependent variable was found to have the highest effect with 9.6% RC variable and 10.9% with F2 variable. The significance of individual innovativeness and its effect on the agility will lead managers to make organizations rapid and flexible more easily and more competitive. This study intends to draw attention to the both variables, namely individual innovativeness and agility. It has been concluded that individual innovativeness will contribute to the agility of enterprises, which have the vision of strategic agility or have innovative goals, and help them to reach their goals. New studies focusing on larger samples can be applied to enterprise managers in different sectors.

Keywords: *Agility, Individual Innovativeness, Confirmatory Factor Analysis,* SME

1. INTRODUCTION

Nowadays, organizational managers focus on individual innovativeness and agility concepts. Organizations also depend on the agility of the organizations as well as on the individual innovation characteristics of their employees to gain a competitive structure. In this research, the relationship between agility and individual innovative behavior is examined. Hurt, Joseph and Cook (1977) firstly used "Individual Innovativeness Scale" in order to determine the level of individual innovativeness. The scale used in this research is Individual Innovativeness Scale which is based on 20 expressions and features of five different categories. Then, these categories of Rogers (1995) were offered as (1) Innovators, (2) Early Adopters, (3) Early Majority, (4) Late Majority and (5) Laggards. In the studies in the literature, it is seen that individual innovativeness is defined in various ways. Some of these definitions are as follows: developing an innovation and adopting or putting it into effect (Yuan and Woodman 2010), exploring new views, supporting them and creating new processes (Nybakk and Hansen 2008), forming new views with organization-wide technological capacity and a skill that provides competition advantage (Walsh, Lynch and Harrington, 2011), creating a new thing, making an overwhelming impression and the ability of making modifications (Bukhari and Mohd, 2012), a new way of offering quality or value to individuals that are encouraged through constructing new information form, a new product, a new process and a new view and fulfilling them successfully (Vujicic and Jovicic, 2013), a phase in which an individual or another unit of making decisions embraces new views according to other members of the unit (Rogers, 1995) or embracing new information technologies (Thatcher, Stepina, Srite and Liu, 2003).When evaluated from conceptual aspect on the other side, individual innovativeness is seen to be divided into categories such as (1) behavioral, (2) global personality trait and (3) domain-specific personality trait.

Competitive planning and quest for quality which began in 1960s gave place to planning that was shaped in accordance with the needs of the market (effectiveness, efficiency, flexibility, responding quickly) in 1990s. Enterprises that make flexible production began to acquire competition advantage and turned into an agile enterprise through the feature of satisfying the needs quickly (Womack el al., 1990; Burgess, 1994; Vokurka and Fliedner, 1998; Hamel and Prahalad,1994). In general terms, lean production methodology that was based on Toyota enterprise was developed in 1990s (Katayama and Bennet, 1999). In fact, improvement constantly began to be made after lean production was suggested. The performance of the enterprise was increased by reaching the goals of low cost and high quality with lean production (Karlsson and Ahlstrom, 1992; Sohal, 1996; Edwards, 1996).

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Unexpected environmental conditions and competitive market conditions forced enterprises to adopt these new approaches with the aim of keeping up with this new situation (Katayama and Bennet, 1999). Finally, the term "agility" was discussed in Lehigh University in USA in 1991, and it was argued that it would provide competitive advantage by improving the production processes (DeVor et al.., 1997; Vokurka and Fliedner, 1998; Sharp et al. 1999). Enterprises that could meet the changing and unexpected demands of the market with an agile production gained a competitive capacity in the global market (Coronado et al., 2002).

Agility and agile production were discussed from many aspects in the literature in the following years. While Gunasekaran (2001) claims that agile production involves flexible production and that it is a sort of computer aided production, Kidd (1994) defines it in his study as a type of production that skilful employees put forward by using technology. Sharifi and Zhang (2001) deal with information technology and agile production together in their methodological approach. Jin-Hai and et al. (2003) assert that enterprises that gain agility in meeting consumers' demands possess competitive superiority in the market by pointing out rapid change (Computer Aided Manufacturing, Computer Integrated Manufacturing, Manufacturing Resource Planning, Enterprise Resource Planning, Electronic Commerce, internet and so on) brings out agility.

Environmental conditions change very quickly. Conducting team work in order to adapt to this change is necessary through a communication in which a division of labor operates smoothly. In this sense, the case of being able to adapt to unexpected situations means agility (Kim, Lee, Kim and Kim, 2006). Agility signifies addressing innovations, high quality, innovation, speed, flexibility, being able to adapt to cultural change, utilizing resources of competitive conditions and offering flexible service and product to the consumer (Sherehiy, Karwowski and Layer, 2007). At the same time, agility is to put innovations into action and thus support the firm and bring success to it. Agile firms can realize opportunities in advance in their product markets and organize themselves as necessary (Sambamurthy, Bharadwaj, Grover, 2003). Agility is the ability of an organization to foresee the potential threats in the working environment and take precautions, identify and seize the opportunities that can be made use of and respond promptly customers and shareholders by re-planning resources and strategies (Ganguly, Nilchiani and Farr, 2009). While agile production and lean production are accepted as a mixed model on the one side (Yao and Carlson, 2003), both of them are claimed to have different characteristics (Prince and Kay, 2003). Yinan, and Boyer (2009) draw attention to the importance of agility in supply chain management to enhance the global competitiveness of business corporations.

2. METHODOLOGY

2.a Participants

160 mid-level and top managers in SME answered the research survey. % 80.7 of the participants were male, %68.5 were postgraduates, %79 were above 30 years old, %34.0 were mid-level managers, %23.7 were top managers, %33.3 were employers, and %9 were human resources managers.

2.b Data Analysis

The survey data which were obtained through convenience sampling were analyzed by using SPSS for Windows and AMOS 22.0 program. For both scales, confirmatory factor analysis was applied and Cronbach's alpha values of both scales were estimated.

2.c Reliability and Validity of Research Scales

In the research, the scale of Yinan and Boyer (2009) was used for agility and the scale proposed by Hurt, Joseph and Cook (1977) was used for individual innovativeness. In this research, while reliability analysis was made, Cronbach's Alpha model was used in order to reveal **adaptive values** that are dependent on correlation. Cronbach's Alpha is the **adaptive value** dependent on correlation between questions. Cronbach's Alpha values which show the total reliability level of expressions in the survey are given in Table 1.

Table 1: Reliability values of the scales used in the research are given in this table

Scales	Number of items	Cronbach's Alpha
Strategic Agility (SA)	**4**	**.754**
F1	4	.784
F2	2	.678
Innovativeness (IN)	**18**	**.888**
Resistance to change (RC)	7	.801
Opinion Leadership (OL)	5	.802
Openness to Experience (OE)	4	.787
Risk taking (RT)	2	.737

The total reliability value in Strategic Agility (SA) scale was found as (.754). It was observed in the sub-dimensions that the level in these dimensions was "quite

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reliable" since reliability coefficient in Factor 1 dimension was (.784) and it was (.678) in Factor 2. Reliability coefficient in Innovativeness (IN) scale was found as (.869). In sub-dimensions, whereas reliability in resistance to change dimension was (.801), it was (.802) in opinion leadership sub-dimension. Totally, the level in Resistance to change and Opinion Leadership sub-dimensions was at the level of "high reliability." While reliability in Openness to Experience sub-dimension was (.787), it was (.737) in Risk taking sub-dimensions. The level for both dimensions was found as "quite reliable."

2.d Confirmatory Factor Analysis of the Scales

Through Confirmatory Factor Analysis, whether measuring models were separately significant for each scale was examined with AMOS 22.0 package program. In rating of confirmatory factor analysis being used in the research, whether models that underwent general test were convenient was decided after chi-square (x^2) value (chi-square value/Freedom rate) being corrected with degree of freedom and values in standardized residual covariance matrix and other goodness of fit indexes were examined (Bagozzi et al., 1999; Byrne, 2009; Schermelleh-Engels, Moosbrugger and Müller, 2003; Blunch, 2008; Bollen, 1989; Fornell and Larcker, 1981).

2. Confirmatory Factor Analysis of Innovativeness (IN)

2 out of 20 items from Individual Innovativeness (IN) were invalidated as their item factor loads were low. In CFA with 5 items, values of item factor load were between (0.51) and (0.77).

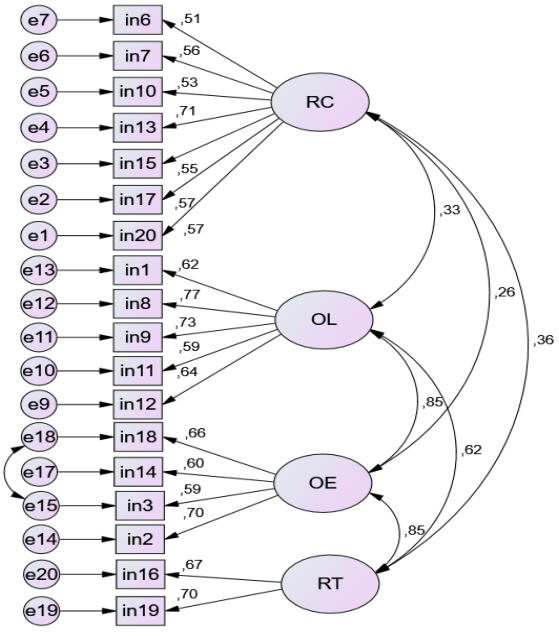

Figure 1: Confirmatory Factor Analysis

As model test values in confirmatory factor analysis was found as x^2 *(157.516),* x^2/df *(1.240),* it was understood that CFA was significant. Also, as fit index values ***GFI*** *(.909),* ***CFI*** *(.963),* ***SRMR*** *(.0532),* ***RMSEA*** *(.039)* were within acceptable frontiers, it was understood that the result of CFA was usable.

2.e Confirmatory Factor Analysis of Strategic Agility (SA) Scale

3 out of 7 items in Strategic Agility scale were invalidated as item factor loads were low. In CFA with the rest 4 items, values of item factor load were between (0.47) and (0.56).

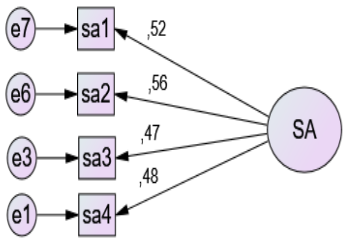

Figure 2: Confirmatory Factor Analysis of Strategic Agility (SA) Scale

As model test values in confirmatory factor analysis was found as x^2 *(.749),* x^2/df *(.374),* it was understood that CFA was significant. Also, as fit index values ***GFI*** *(.998),****CFI*** *(.999),* ***SRMR*** *(.0163)* , ***RMSEA*** *(.000)* were within acceptable frontiers, it was understood that the result of CFA was usable (Byrne, 2009; Schermelleh-Engel, Moosbrugger and Müller, 2003; Blunch, 2008).In the analysis of correlation between scale sub-dimensions used in the research (Table 4 is given Appendix 1);

a. There is a positive statistically significant relationship (p <0.05) between the SA variable and the F2 (.456 **) and IN (.675 *) variables. It was also found that there was a positive relationship between the SA variable and the OL subscale of IN (0.498 **).

b. There is no significant relationship between SA variables and F1 and OE variables (p> 0.05).

In hierarchical regression analysis of SA dependent variable with other variables (Table 5 is given Appendix 2);

a. The SA dependent variable was not statistically significant in terms of independent variables IN, OE, and RT and gender and age (p> 0.05) variables in the predictive model by hierarchical regression analysis. It was found that the model was effective when it had independent variables F2, RC and

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OL ($p < 0.05$). With this model, the SA variable could be explained by 30.7%.
b. The SA dependent variable affects the F2 independent variable as positive (.595). The SA dependent variable affects the RC independent variable as positive (.664).
c. It is understood that the highest contribution to SA dependent variable is provided by RC variable (9.6%) and F2 variable (10.9%).

3. RESULTS AND CONCLUDING REMARKS

The rapid change which is caused by globalization and technological development make it crucial for enterprises that they should act quickly and flexibly in order to sustain their existence. As the basis of speed and flexibility, it is also important for enterprises to choose and organize human resource correctly and offer a healthy communication environment in which they maintain team work and division of labor operates smoothly. In this context, by means of this emerging agility, enterprises will gain a structure which enables them to respond innovations, catch high quality, adapt to environmental change, use resources of competitive conditions well and present flexible service and product to the consumer.

Agility is the ability of an organization to foresee the potential threats in the working environment and take precautions, identify and seize the opportunities that can utilized and respond promptly customers and shareholders by re-planning resources and strategies. Agility is to keep up with innovations in the market in terms of service and product and provide a sustainable growth. In this research, confirmatory factor analyses were made regarding individual innovativeness and strategic agility. As model test values x^2, x^2/df were found as significant in confirmatory factor analysis, CFA is understood to be significant. Moreover, as fit index values indicated with ***GFI***, ***CFI***, ***SRMR*** and ***RMSEA*** were within acceptable frontiers, it was understood that the result of CFA was usable. On the other hand, reliability and validity values of each scale were tested with Cronbach's Alpha model.

In the analysis of the correlation between the scale sub-dimensions used in the study, a positive statistically significant relationship was found between Agility and F2 and IN variables. On the other hand, there is no significant relationship between Agility and F1 and OE variables. Agility dependent variable was not statistically influenced by the independent variables F1, IN, OE and RT variables in the hierarchical regression analysis model. The effects of gender and age on agility are not statistically significant. With this model, Agility dependent variable could be explained by 30.7%. Agility dependent variable affects F2 and RC independent variables positively. It is understood that F2 variable provides the highest contribution to Agility dependent variable with RC variable.

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Appendix 1:

Table 4. Pearson correlation analysis applied between scale sub-dimensions

NO		1	2	3	4	5	6	7	8
1	SA	1							
2	F1	.015	1						
3	F2	.456**	.470**	1					
4	***IN***	.675**	.491**	.280*	1				
5	***RC***	.031	.407**	.255*	.904**	1			
6	***OL***	.498**	.476**	.247**	.890**	.619**	1		
7	**OE**	.100	.614**	.429**	.512**	.380*	.544**	1	
8	**RT**	.123	.555**	.394*	.491**	.367**	.547**	.922**	1

P<0,05 **P<0,01 SA: STRATEGIC AGILITY F1: DIMENSION OF SA F2: DIMENSION OF SA IN: INNOVATIVENESS RC: RESISTANCE TO CHANGE OL: OPINION LEADERSHIP OE: OPENNESS TO EXPERIENCE RT: RISK TAKING

Appendix 2:

Table 5. Hierarchical regression analysis of Strategic Agility (SA) dependent variable with other variables

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P	R^2	ΔR^2
	B	SE	Beta				
(Constant)	1.933	.852		2.364	.045*		
F1	.216	.210	.114	1.248	.353	.000	.000
F2	.595	.013	.292	3.253	.001**	.089	%10.9
IN	.199	.237	.246	1.418	.119	.091	%1.1
RC	.664	.267	.528	5.222	.000**	.193	%9.6
OL	.452	.357	.342	2.312	.006**	.242	%9.1
OE	.028	.285	.025	.182	.912	.217	%0
RT	.049	.155	.032	.342	.757	.237	%0
Gender	.001	.234	.000	.013	.928	.236	%0
Age	.001	.025	.005	.061	.946	.239	%0

**p<0.05 **p<0.01 SA: Strategic Agility (SA) F2: Factor of SA; F1: Factor of SA; Innovativeness (IN);Resistance to change (RC); Opinion Leadership (OL); Openness to Experience (OE); Risk taking (RT)*