Investigating Effect of Entrepreneur’s Personal Attributes and Cognitive Heuristics on the Quality of Entrepreneurial Strategic Decision Making

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Abstract

Purpose: The present study is designed to investigate the effects of entrepreneurs’ motivational and attitudinal characteristics, cognitive biases and heuristic and demographic factors on the quality of entrepreneurial strategic decision making.

Design/methodology/approach: Research implication is derived from the implementation of structural equation modeling technique. The Samples were 110 Iranian prominent entrepreneurs during the period 2010-2011 selected from Iran’s Ministry of Labor and Social Affairs database. The Main data collection instrument was questionnaire. Structural equation modeling and confirmatory factor analysis methods were used to analyze model.

Findings: Based on the findings obtained from confirmatory factor analysis, measurement model demonstrated an acceptable fit to the data and the mediating indicators properly measure variables in the integrated model. According to structural equation modeling, entrepreneurs' attitudinal characteristics have negative effects on the quality of entrepreneurial strategic decision making, while the effects of entrepreneurs' motivational characteristics on the quality of entrepreneurial strategic decision making are positive. Furthermore, the effects of demographic factors and overconfidence bias on the quality of entrepreneurial strategic decision making are positive, however representation bias has a negative effect on it.

Originality/value: Each of the previous studies endeavored to measure the effects of one or more variables on the quality of entrepreneurial strategic decision making. While the main implication of this study is to collect all related variables in an integrated model and to investigate cumulative effects of these variables on the quality of entrepreneurial strategic decision making. Thus, present findings are based on the cumulative effects of entrepreneur’s personal attributes and cognitive biases and heuristics on the quality of entrepreneurial strategic decision making which have not been investigated in previous study yet.

Keywords: Entrepreneurial Strategic Decision Making, Motivational Characteristics, Attitudinal Characteristics, Cognitive Biases and Heuristics, Demographic Factors

Paper type: Research Paper

Introduction

Entrepreneurial strategic decision making (ESDM) is a goal-directed cognitive process of high task decision which involves a high degree of complexity and uncertainty (Curseu et al., 2010). According to Vermeulen and Curveu (2010), decisions adopted by entrepreneurs are the essence and heart of entrepreneurship. They hold that this type of decision making is critical for survival of entrepreneurial enterprises, to the extent that the success of entrepreneurial enterprise depends on strategic decision making.
Concluding from previous research on entrepreneurial strategic decision making, Curseu et al. (2010) found that entrepreneurs are often the only decision makers in an entrepreneurial enterprise. Because of this, major parts of researches in the field of entrepreneurial decision making have focused on identifying entrepreneurs’ personality traits and characteristics, and the effects of these characteristics on entrepreneurial decision making process. In this regards, Curseu et al. (2010) introduced cognitive, psychological, motivational and attitudinal traits as important factors influencing entrepreneurial strategic decision making. Moreover they believed that since entrepreneurial strategic decision is highly complex in nature, entrepreneurs usually tend to exercise cognitive biases and heuristics when making strategic decisions. In addition to these findings, Curseu and Louwers (2010), emphasize on demographic factors as also significant in influencing the qualities of entrepreneurial strategic decision making.

Relying on these findings, the present study aims to test the cumulative effects of an integrated model encompassing entrepreneurs’ motivational and attitudinal characteristics, cognitive biases and heuristics and demographic factors, which in previous researches on quality of entrepreneurial strategic decision making are studied separately.

Literature Review

Entrepreneurial Strategic Decision Making

According to Schoemaker (1993) strategic decisions are ‘intentional choices or programmed responses about issues that materially affect the survival prospects, well-being and nature of the organization’ and as argued by Curseu et al. (2010) entrepreneurial strategic decision is a special type of strategic decision in which decision maker is either an entrepreneur or a small business owner. Based on Stewart and Roth (2001) strategic decision may be influenced by such factors as strategy and cognition and more important than these according to Noorderhaven (1995) strategic decisions have four important characteristics which are: complexity, uncertainty, rationality, and control. In summary, the body of literature associated with ESDM shows that existing research in this field addressed special factors and characteristics influencing entrepreneurial strategic decision making only separately. Related factors in various studies are summarized in Table 1.

Table 1: Factors Influencing Entrepreneurial Strategic Decision Making (ESDM)

<table>
<thead>
<tr>
<th>Related Studies</th>
<th>Factor Influence Entrepreneurial Strategic Decision Making (ESDM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mintzberg et al. (1976); Papadakis et al. (1998); Mador (2000)</td>
<td>The environment, the specific characteristics of the decision to be taken and the entrepreneur him/herself.</td>
</tr>
<tr>
<td>Papadakis et al. (1998)</td>
<td>Decision-specific, environmental and organizational factors</td>
</tr>
<tr>
<td>Schneider and de Meyer (1991)</td>
<td>Manager's individual characteristics, internal organizational context and environmental factors.</td>
</tr>
<tr>
<td>Elbanna and Child (2007)</td>
<td>Decision-specific, environmental and firm characteristics,</td>
</tr>
<tr>
<td>Gibcus et al. (2010)</td>
<td>The individual (the entrepreneur), the environment, and the strategic decision process itself</td>
</tr>
<tr>
<td>Gibcus et al. (2010)</td>
<td>The entrepreneur`s approach (rational, emotional or intuitive)</td>
</tr>
<tr>
<td>Curseu et al. (2010)</td>
<td>Personal attributes and characteristics, several attitudinal (risk taking), motivational (self-esteem), emotional (anticipated affect, post-decision affect) and cognitive (cognitive styles, heuristics and biases)</td>
</tr>
</tbody>
</table>
Curseu et al. (2010) | Entrepreneurs in strategic decision making are more sensitive to heuristics and biases in estimating probabilities of events
---|---
Kunreuther et al. (2002) | Strategic decisions are highly complex and very susceptible to biases in information processing
Busenitz and Barney (1997); Busenitz, (1999). | Entrepreneurs are a special category of decision-makers and several characteristics (cognitive, motivational and ?
Curseu and Louwers (2010) | Education, Experience and Age have effect on Quality of ESDM outcomes
Bakker et al. (2007) | Risk Propensity, self Efficacy, sensitivity to biases and heuristics that impact on outcome of ESDM is mediated by cognitive complexity
Curseu (2006) | Need for cognition is positively associated with the rationality in decision making
Bakker et al. (2007) | These are cognitive heuristics and biases mechanisms used by entrepreneurs to simplify overly complex and unpredictable decision situations

*Attitudinal Characteristics and Demographic Factors Influencing ESDM*
According to Curseu et al. (2010) and Curseu (2006), entrepreneurs who are responsible for making strategic decisions in entrepreneurial enterprises are typically the only decision makers in their organizations. Thus, their personal attributes such as attitudinal factors; including risk propensity and tolerance for ambiguity, and motivational factors; including self-efficacy and need for cognition, have been introduced as important characteristics that affect the way entrepreneurs make decision.
Moreover, demographic factors; including entrepreneurial experiences, age and education are among elements which have been examined by Curseu and Louwers (2010) in term of their effects on the quality of strategic decisions made by entrepreneurs.

*Entrepreneurs’ Cognitive Biases and Heuristics Influencing ESDM*
According to Busenitz and Barney (1997) since cognition of individuals and consequently entrepreneurs is limited, neither they are able to search for information in a systematic and comprehensive way nor can interpret these information precisely. This would result in occurrence of cognitive biases and heuristics in entrepreneurs’ decisions making process (Keh et al., 2002).
In this regard Curseu et al. (2010) stress that entrepreneurial strategic decisions are highly complex in nature, therefore entrepreneurs are really sensitive toward cognitive biases and heuristics in their decision making. In other words, due to the environmental complexity and uncertainty, entrepreneurial strategic decisions are of those types of decisions in which decision makers regularly focus on existing alternatives and are highly tend to simplify their decisions based on cognitive biases and heuristics. It is noteworthy that according to Busenitz and Barney (1997) two types of heuristics which received considerable attention in entrepreneurship decision making literature are overconfidence and representation biases.

*Hypotheses Development*
Before proceeding further, in order to achieve research objectives, we offer an integrated model which consists of risk propensity, tolerance for ambiguity, self-efficacy, need for cognition,
entrepreneurial experiences, age, education and Entrepreneurs’ Cognitive Biases and their cumulative effects on the quality of ESDM (Figure 1).

![Figure 1: Integrated Model Based on Previous Studies](image)

According to Curseu and Louwerz (2010), the entrepreneur’s education has positive effects on the quality of his strategic decisions. Furthermore, De Kort and Vermeulen (2010) believe that the entrepreneur’s level of education is one of the demographic variables directly influencing quality of his/her strategic decision making. In fact, highly educated entrepreneurs perceive the quality of their decisions as being higher than entrepreneurs with a lower level of education (Vermeulen and Curseu, 2010). This is because they possess more information and knowledge which influence their understanding of factors related to decision making in a more comprehensive way. Therefore:

\[ H1a: \text{Increasing entrepreneurs’ educational level has a positive effect on increasing the quality of entrepreneurial decision making.} \]

Based on Mitchell et al. (2002) highly educated entrepreneurs have more comprehensive knowledge structures which influences the way they process information. According to De Kort and Vermeulen (2010) because the overconfidence bias can be seen as a way of processing information, high education level can also influence the entrepreneur’s overconfidence bias. Accordingly:

\[ H1b: \text{Increasing entrepreneurs’ educational level has a positive effect on increasing entrepreneurs’ tendency to overconfidence biases.} \]

Curseu and Louwerz (2010) emphasize that the effects of experience on entrepreneurial strategic decision making would change by the influence of mediator variables such as cognitive complexity of an entrepreneur, whereas the direct effect of experience on the quality of entrepreneurial strategic decision making is negative. They also indicate that since entrepreneurs’ high experience will result in tendency to overconfidence bias, it will decrease the quality of entrepreneurial strategic decision making. Therefore:
H2a: Increasing entrepreneurs’ experience has a negative effect on the quality of entrepreneurial strategic decision making.

Based on Curseu (2010), experienced entrepreneurs more often use heuristic style of information processing and based on this, they are more subject to tendency toward overconfidence bias. Also as suggested by Kaish and Gilad (1991) highly experienced entrepreneurs have more tendency toward overconfidence bias and this, has positive effects on the quality of their decision making. So:  
H2b: Increasing entrepreneurs’ experience has a positive effect on their tendency toward overconfidence bias.

As mentioned by Taylor (1975) increasing age leads to reduced quality of entrepreneur's strategic decisions. Also, based on Curseu and Louwerz (2010) due to mediation role of cognitive complexity between age and the quality of strategic decisions, older entrepreneurs make strategic decision with lower level of quality. Accordingly:

H3a: increasing Entrepreneurs’ age has a negative effect on the quality of their strategic decision making.

Based on Taylor (1975) older entrepreneurs have less capability in information processing. In this regard, younger people are more capable in perceiving integrating and processing information from the environment (Parker, 2006). In this respect and based on De Kort and Vermeulen (2010), younger entrepreneurs make less use of cognitive biases and heuristics. On the other hand, they suggested that while entrepreneurs’ age increases their tendency toward overconfidence bias decreases. Therefore:

H3b: increasing Entrepreneurs’ age has a negative effect on their tendency toward overconfidence bias.

According to Curseu (2010) entrepreneurs’ risk propensity has a negative effect on entrepreneurial strategic decision making due to the mediation role of cognitive complexity; because entrepreneurs with high level of risk propensity ignore complexity which according to Noorderhaven (1995) is one of the important characteristics of strategic decisions. Also, as it is believed by Curseu (2010) entrepreneurs with high risk propensity often make their decisions with less careful considerations for environment and other aspects of decision making process and this will lead to negative effects on entrepreneurial strategic decision making. Therefore:

H4: Entrepreneurs’ tendency to risk propensity has a negative effect on the quality of entrepreneurial strategic decision making.

Based on Curseu (2010) entrepreneurs’ high tolerance for ambiguity increases the decision makers’ ability to confidently make decision in the absence of information or under the environmental uncertainty. He believes that due to the mediation role of cognitive complexity an entrepreneur with high tolerance for ambiguity is more confident in making decisions under uncertain circumstances. In this regard, they ignore complexity and uncertainty which according to Noorderhaven (1995) are one of the important characteristics of strategic decisions. So:

H5: the entrepreneur’s high tolerance for ambiguity has a negative effect on the quality of entrepreneurial strategic decision making.

As mentioned by Bakker et al. (2007) entrepreneurs with high level of self-efficacy have more ability to mobilize and use cognitive and motivational resources to increase the sense of control over different life events. As Noorderhaven (1995) pointed out, one of the four basic concepts
inherent in strategic decision making is control. meanwhile high self-efficacy is closely related to high control as a key component of strategic decision making situations (Curseu et al., 2010). So:

**H6: Entrepreneurs’ high self-efficacy has a positive effect on the quality of entrepreneurial strategic decision making.**

Result from a study by Bakker et al. (2007) shows that the need for cognition is the central concept in cognitive motivational literature and entrepreneurs with high need for cognition tend to seek, acquire, think about and reflect on relevant information when solving cognitive tasks and Curseu (2006) showed that need for cognition is positively associated with rationality in decision-making. He believed that it results in operationalisation decisions by entrepreneurs. Given this evidence, entrepreneurs with high need for cognition ignore rationality which according to Noorderhaven (1995), is one of the four fundamental characteristics of strategic decision making. Accordingly:

**H7: Entrepreneurs’ high need for cognition has a positive effect on the quality of entrepreneurial strategic decision making.**

Curseu and Louwers’s (2010) study demonstrates that entrepreneurs’ high tendency to overconfidence bias will increase their confidence in decision making process and according to Espedal (2006), due to this confidence, entrepreneurs are considered as optimists individuals which place more value on their successes and try to overlook their unproductive experiences. Therefore, they overestimate their prospect of success and often generalize their own experience which in turn leads to their tendency to representativeness bias. Therefore:

**H8: Entrepreneurs’ tendency to overconfidence bias results in increasing their tendency to representativeness bias.**

Curseu (2010) and Busenitz (1999), maintain that since entrepreneurs face lack of information and environmental uncertainty, they often rely on small unsystematic samples or on their own experience and this reduces the quality of their strategic decisions. Therefore:

**H9: Entrepreneurs’ tendency to representativeness bias has a negative effect on the quality of entrepreneurial strategic decision making.**

Finally according to findings by De Kort and Vermeulen (2010), in the absence of information, decision makers are more likely to rely on overconfidence bias and often attempt to predict information deficiently on their own. But since Simon (1986) is of the opinion that human-beings have limited rationality, thus their assessments are of lower accuracy. Therefore, rationality which is one of the requirements of strategic decision making (Noorderhaven, 1995) would be ignored by these individuals. On the other hand, according to Curseu and Louwers (2010), these people tend to simplify decision making processes and ignore the complexity of strategic decision making. So:

**H10: Entrepreneurs’ tendency to overconfidence bias has a negative effect on the quality of entrepreneurial strategic decision making.**

**Research Methodology**

This paper aimed to investigate the effects of entrepreneurs’ motivational and attitudinal characteristics, their cognitive biases and heuristic and demographic factors on the quality of entrepreneurial strategic decision making. For this purpose, research implication was derived from implementing descriptive survey method, and since the main objective of the research was to test specific models of relations between variables, structural equation modeling (SEM) applied as research methodology.
The Sample, Data and Questionnaire

Unit of analysis in this study includes the top owner managers of superior Iranian entrepreneurial enterprises. The sample was selected from Iran’s ministry of Labor and Social Affairs’ database (related to 2010 and 2011) which is an annual reporting for introducing superior entrepreneurial enterprises (It should be noted that enterprises which are selected each year as superior entrepreneurial enterprises in Iran include those SMEs with 10 to 250 employees). Enterprises in the sample were selected using simple random sampling which is a subset of individuals chosen from a larger set (Yates et al, 2008). Each individual was chosen randomly and entirely by chance, such that each individual had the same probability of being chosen during the sampling process.

A total of 115 surveys were distributed, and after analyzing the extent and pattern of missing data, the sample of 110 usable questionnaire were preserved by using the combined method of imputation (following the procedure from Antoncic and Hisrich, 2001).

The questionnaire which released from an exploratory research conducted by Mehrabi (2011) was addressed to the top owner manager of each enterprise and anonymity was guaranteed. Owner managers were chosen as the key informants since they were likely to be the most knowledgeable with respect to the overall situation, activities, and orientations of their entrepreneurial enterprises. Completed questionnaires representing a response rate of 70.96%. Male respondents formed 62.1% of the participants, while female formed 37.9% of the participants, Table 2 to 4 summarize the key demographic characteristics of the study sample.

Table 2: Age Distribution of Participants

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>20</td>
<td>12.1</td>
<td>48.3</td>
</tr>
<tr>
<td>30-40</td>
<td>49</td>
<td>48.3</td>
<td>77.6</td>
</tr>
<tr>
<td>40-50</td>
<td>35</td>
<td>29.3</td>
<td>89.7</td>
</tr>
<tr>
<td>50 and above</td>
<td>6</td>
<td>10.3</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

In term of age, the participants were categorized into 4 groups (20-30, 30-40, 40-50, 50 and above). As the data shows in table 2, maximum frequency relates to age group 30-40, after that 40-50, and minimum frequency relates to age group 50 and above.

Table 3: Participants’ Experience

<table>
<thead>
<tr>
<th>Work experience (years)</th>
<th>Number</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5</td>
<td>8</td>
<td>8.6</td>
<td>36.2</td>
</tr>
<tr>
<td>5-10</td>
<td>9</td>
<td>8.65</td>
<td>63.8</td>
</tr>
<tr>
<td>10-15</td>
<td>30</td>
<td>27.6</td>
<td>82.8</td>
</tr>
<tr>
<td>15-20</td>
<td>19</td>
<td>19.0</td>
<td>91.4</td>
</tr>
<tr>
<td>20 and above</td>
<td>44</td>
<td>36.2</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

In term of experience, participants were categorized into five groups. As shown in Table 3, maximum frequency relates to entrepreneurs with more than 20 years experience and the minimum relates to entrepreneurs with less than 5 years.
Table 4: Participants’ Educational Level

<table>
<thead>
<tr>
<th>Educational Level</th>
<th>Number</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.A.</td>
<td>54</td>
<td>67.3</td>
<td>67.3</td>
</tr>
<tr>
<td>M.A.</td>
<td>44</td>
<td>24.1</td>
<td>91.4</td>
</tr>
<tr>
<td>PhD</td>
<td>12</td>
<td>8.6</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

As shown in table 4, in term of education level, participants were categorized into 3 levels of B.A., M.A., and PhD, which maximum frequency relates to B.A. level and minimum relates to PhDs.

**Validity and Reliability**

To measure validity of the questionnaire, first a sample of 14 questionnaires sent to entrepreneurs which selected from mentioned database randomly. Entrepreneurs were requested to answer to the questions and simultaneously express any ambiguity or error existing in the questionnaire. After receiving these modifications, the final questionnaires were prepared and applied for the final test.

In addition, in order to determine the reliability coefficient of questionnaire, Cronbach’s Alpha method was applied and result showed that reliability coefficient for questionnaire is %89, which indicates an acceptable reliability for questionnaire. Cronbach’s Alpha for each variable listed in table 5.

Table 5: Reliability by Cronbach’s Alpha Method

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number of the question in questionnaires</th>
<th>Alpha’s coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivational Characteristics</td>
<td>1-16</td>
<td>0.83</td>
</tr>
<tr>
<td>Attitudinal Characteristics</td>
<td>17-35</td>
<td>0.76</td>
</tr>
<tr>
<td>Demographic factors</td>
<td>36-45</td>
<td>0.70</td>
</tr>
<tr>
<td>Cognitive biases and heuristics</td>
<td>46-60</td>
<td>0.78</td>
</tr>
<tr>
<td>Entrepreneurial Strategic Decision making</td>
<td>61-72</td>
<td>0.75</td>
</tr>
<tr>
<td>All</td>
<td>1-72</td>
<td>0.89</td>
</tr>
</tbody>
</table>

**Data Analysis and Findings**

In order to Measure and analyze Integrated model, a two-phase, two-step procedure recommended by Anderson and Gerbing (1988) was applied. In the first step, confirmatory factor analysis method (CFA) conducted to develop measurement model and to demonstrate that this model fits to the data properly. Measurement model described the nature of the relationship between numbers of manifest indicators, which their role is to measure main variables.

In second step, the structural model was tested and revised until a theoretically meaningful and statistically acceptable model was found. It should be noted that we applied LISREL8.7. for SEM analysis and SPSS18 for descriptive analysis of participants (See table 2-4).

**Confirmatory Factor Analysis Findings**

Because there is no clear consensus as the best fit indices for the evaluation of measurement model, confirmatory factor analysis were used to establish an acceptable measurement model and to determine whether mediating indicators can properly measure variables which are integrated the model.
As mentioned earlier, the integrated model includes nine variables. Each of them was measured by some mediating indicators. CFA analysis showed that factor loadings for indicators related to risk propensity are between 82% and 92%. Factor loadings for indicators related to tolerance for ambiguity are between 51% and 91%. Factor loadings for indicators related to self-efficacy are between 72% and 93% and factor loadings for indicators related to need for cognition are between 86% and 96%. Also, Factor loadings for indicators related to the age are between 85% and 91%, for education are between 83% and 94%, for overconfidence are between 55% and 90%, for representativeness are between 90% and 92% and finally factor loadings for indicators related to entrepreneurial strategic decision making are between 73% and 93%.

Also, it should be noted that all the factor loadings of the mediators were statistically significant at the .05 level. So according to these findings, the measurement model demonstrated an acceptable fit to the data and mediating indicators properly measure variables in the integrated model.

**Findings from Structural Equation Modeling Analysis**

As mentioned earlier, structural equation modeling applied for testing and estimating causal relations between variables, using a combination of statistical data and qualitative causal assumptions. Also it should be noted that assessment of fit is a basic task in SEM modeling which means forming the basis for accepting or rejecting models. So in this part the integrated model was tested against the obtained measurement data to determine how well the model fits the data.

As Bollen and Long (1993) stated, the output of structural equation modeling includes matrices of the estimated relationships between variables in the model. So in present study assessment of fit calculated to clarify how the predicted data are similar to matrices containing the relationships in the actual data. Fit indices which are listed in table 6 have been developed for these purposes.

It is worth to note that each variables of the model can also be examined within the structural equation modeling in order to see how well the proposed model fits the driving theory. Actually structural equation modeling makes such tests of the integrated model possible.

**Table 6: Fit Indices for Model**

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Acceptable Limit Based on Various Studies</th>
<th>Results for Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted Goodness of Fit Index (AGFI)</td>
<td>Between 0-1, but leaning toward 1 is better</td>
<td>0.92</td>
</tr>
<tr>
<td>Goodness of Fit Index (GFI)</td>
<td>Between 0-1, but leaning toward 1 is better</td>
<td>0.93</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>Larger than 90% is acceptable and shows the fitness of model</td>
<td>0.98</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>For good models, it is equal to or less than 0.05</td>
<td>0.097</td>
</tr>
<tr>
<td>Incremental Fit Index (IFI)</td>
<td>Between 0-1, but leaning toward 1 is better</td>
<td>0.90</td>
</tr>
<tr>
<td>Normative Fit Index (NFI)</td>
<td>Larger than 90% is acceptable and shows the fitness of model</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Based on structural equation modeling, adjusted goodness of fit index is 0.92, and goodness of fit index is 0.93. Since these indices are between 0-1, integrated model has goodness of fit to data. Also as comparative fit index is 0.98, and normative fit index is 0.97, the fitness of model is clarified.
Specific Predictions by Structural Equation Modeling

Structural equation modeling (SEM) started out with hypotheses which represented in an integrated model. SEM allowed integrated model suite to both testing and development. The variables used in hypotheses must then be operationalized to allow testing of the relationships between the variables in the integrated model.

So in this part in order to test initial hypotheses and adjust them in light of model evidence, standard path and T-statistics coefficient was measured and results are listed in table7.

It should be noted that SEM test was based on the assumption that the correct and complete relevant data have been modeled.

Table 7: Specific Predictions by Structural Equation Modeling

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>T-statistics</th>
<th>Standard Path Coefficient</th>
<th>Error</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: Increasing entrepreneurs’ educational level has a positive effect on increasing the quality of entrepreneurial decision making.</td>
<td>9.27</td>
<td>0.57</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H1b: Increasing entrepreneurs’ educational level has a positive effect on increasing entrepreneurs’ tendency to overconfidence biases</td>
<td>28.28</td>
<td>0.94</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H2a: Increasing entrepreneurs’ experience has a negative effect on the quality of entrepreneurial strategic decision making.</td>
<td>0.62</td>
<td>0.062</td>
<td>0.000</td>
<td>Not Confirmed</td>
</tr>
<tr>
<td>H2b: Increasing entrepreneurs’ experience has a positive effect on their tendency toward overconfidence bias.</td>
<td>9.28</td>
<td>0.57</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H3a: increasing Entrepreneurs’ age has a negative effect on the quality of their strategic decision making.</td>
<td>1.29</td>
<td>0.057</td>
<td>0.000</td>
<td>Not Confirmed</td>
</tr>
<tr>
<td>H3b: increasing Entrepreneurs’ age has a negative effect on their tendency to overconfidence bias.</td>
<td>8.10</td>
<td>0.51</td>
<td>0.004</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H4: Entrepreneurs’ tendency to risk propensity has a negative effect on the quality of entrepreneurial strategic decision making.</td>
<td>9.24</td>
<td>0.58</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H5: An entrepreneurs’ high tolerance for ambiguity has a negative effect on the quality of entrepreneurial strategic decision making</td>
<td>12.20</td>
<td>0.40</td>
<td>0.007</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H6: Entrepreneurs’ high self- efficacy has a positive effect on the quality of entrepreneurial strategic decision making.</td>
<td>11.95</td>
<td>0.65</td>
<td>0.007</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H7: Entrepreneurs’ high need for cognition has a positive effect on the quality of entrepreneurial strategic decision making</td>
<td>13.92</td>
<td>0.75</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H8: Entrepreneurs’ tendency to overconfidence bias results in increasing their tendency to representativeness bias</td>
<td>10.35</td>
<td>0.67</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
</tbody>
</table>
Table 7: Specific Predictions by Structural Equation Modeling

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>T-statistics</th>
<th>Standard Path Coefficient</th>
<th>Error</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>H9: Entrepreneurs’ tendency to representativeness bias has a negative effect on the quality of entrepreneurial strategic decision making.</td>
<td>14.25</td>
<td>0.75</td>
<td>0.005</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H10: Entrepreneurs’ tendency overconfidence bias has a negative effect on the quality of entrepreneurial strategic decision making</td>
<td>1.29</td>
<td>0.075</td>
<td>0.000</td>
<td>Not Confirmed</td>
</tr>
</tbody>
</table>

Result from hypothesis testing by structural equation modeling stated that in T-statistics 0.62 and standard path coefficient 0.062 in standard error 0.000 hypothesis H2a rejected. Also in T-statistics 1.29 and standard path coefficient 0.057 in standard error 0.000 hypotheses H3a, and in T-statistics 1.29 and standard path coefficient 0.075 in standard error 0.000 hypothesis H10 rejected.

Discussion and Conclusion
The present study undertook to investigate the effects of entrepreneurs’ motivational and attitudinal characteristics, cognitive biases and heuristics and demographic factors on the quality of entrepreneurial strategic decision making.
As mentioned earlier, each of the previous studies attempted to measure the effect of one or more of these variables (Risk propensity, Tolerance for ambiguity, Self-efficacy, Need for cognition, Representation, Overconfidence, Experiences, Age, and Education) on the quality of entrepreneurial strategic decision making. While the main implication of this study is to collect all related variables in an integrated model and to investigate the cumulative effects of these variables on the quality of entrepreneurial strategic decision making. Thus, our findings are based on cumulative effects of entrepreneurs' motivational and attitudinal characteristics, cognitive biases and heuristics and demographic factors on the quality of entrepreneurial strategic decision making, which have not been investigated by previous studies yet. As a result the findings of this study differ from previous studies. The results are clearly described in the following:
Based on the findings obtained from confirmatory factor analysis, measurement model demonstrated an acceptable fit to the data and the mediating indicators properly measure variables in the integrated model.
Regarding the evidence resulted by applying structural equation modeling, there are causal relationships between variables in the integrated model. Also based on relevant Indices for model specially AGFI =0.92, RMSEA=0.97, NFI=0.97, IFI =0.90, and CFI=0.98, it is established that integrated model has acceptable consistency with the data. Acceptable integrated model based on present research with proper indices are shown in figure 2.
In addition result from testing initial hypotheses by structural equation modeling indicated that hypotheses H1b, H2b, H3b, H4, H5, H6, H7, H8, H9, have matched to the evidence, while hypotheses H2a, H3a and H10 haven't suited to evidence data and rejected. Following, results from specific hypotheses testing explained from the view point of participants and then compared to previous researches:

From the perspective of top owner managers of superior Iranian entrepreneurial enterprises, increasing educational level results in high quality strategic decision making. According to this evidence hypothesis H1a is in accordance with the results obtained by Curseu and Louwers (2010) and De Kort and Vermeulen (2010). Also, as believe by superior Iranian entrepreneurs, high education results in tendency to overconfidence bias. Entrepreneurs in this research consider their educational background as a basis for their overconfidence, while making strategic decision in lack of sufficient information in entrepreneurial environment. So it estimated that hypothesis H1b is in accordance with the results obtained by De Kort and Vermeulen (2010).

According to top owner entrepreneurs' viewpoint, increasing entrepreneurs’ experience leads to high quality strategic decision making. They believe that relying on their own experience would result in high quality strategic decision making. Thus, the Hypothesis H2a is not in accordance with the result obtained by Curseu and Louwers (2010).

However, based on the present study, increasing entrepreneurs’ experience leads to increasing entrepreneurial tendency toward overconfidence bias. Therefore, hypothesis H2b is in accordance with the results obtained by Kaish and Gilad (1991) and Curseu (2010).

During data analysis process, it was founded out that superior Iranian entrepreneurs consider age as a factor which has positive effect on strategic decision making quality. They believe that as they become older, their experience increases and this leads to high quality decision making. So, the hypothesis H3a is not in accordance with the results obtained by Taylor (1975) and Curseu and Louwers (2010).
Although entrepreneurs believe that while they become older, their tendency toward overconfidence bias decreases. They argued that by age increasing, their knowledge structure and their capability in memorizing information would be undermined and these lead to reduce their tendency toward overconfidence bias. Thus, hypothesis H3b is in accordance with the results obtained by De Kort and Vermeulen (2010).

From perspective of the top Iranian entrepreneurs, risk propensity is an entrepreneurial trait which leads to low quality strategic decisions. They believe that high attitude toward risk propensity deters them from paying full attention to all aspects of environment, where they are making decision. Accordingly, hypothesis H4 is in accordance with the results of studies done by Curseu (2010).

The top Iranian entrepreneurs consider tolerance for ambiguity as a factor which has negative effect on quality of their strategic decision making. Because from their viewpoint, high tolerance for ambiguity makes the entrepreneurs to involve themselves less in action such as information searching and processing, while making decisions about strategic issues, and this results in paying less attention to decision and subsequently leads to the low quality strategic decision making. Therefore, hypothesis H5 is in accordance with the results obtained by Curseu (2010).

Besides, result from testing hypothesis H6 indicated that self efficacy has strong effect on quality of entrepreneurial strategic decision making. From perspective of entrepreneurs who participate in this research, individuals with high self efficacy have high cognitive ability, and believe that can control and mobilize resource in entrepreneurial environments and this belief would lead to making high quality strategic decisions. Thus, hypothesis H6 is in accordance with results obtained by Baron (2004) and Backer et al. (2007).

As analysis continued it became apparent that participants consider need for cognition as an influencing factor which increases quality of entrepreneurial strategic decision making. They stated that this motivational factor enables them to remember related information and strategic issues, and therefore to analyze their decisions with more accuracy and quality. Accordingly, hypothesis H7 is in accordance with the results obtained by Curseu (2006).

Hypothesis H8 which stated that tendency toward confidence bias increases tendency to representativeness bias was confirmed by participant in research. They declared that they rely on their self-confidence and their own experience most of the time as a criterion for making strategic choice. Therefore, hypothesis H8 is in accordance with the results of Espedal (2006) and Curseu and Louwers (2010).

In addition, the superior Iranian entrepreneurs believe that tendency toward representativeness bias and relying on their own experiences, especially in strategic issues, lead to a low quality decision making. Therefore, hypothesis H9 is in accordance with studies by Curseu (2010) and Buseintz (1999).

Eventually, structural equation modeling analysis demonstrated that entrepreneurial overconfidence bias is often result of high experience in decision making, especially if entrepreneur is the only responsible for making strategic choice. In this regards, overconfidence bias leads to high quality entrepreneurial strategic decisions. Accordingly, hypothesis H10 is not in accordance with the results obtained by De Kort and Vermeulen (2010) and Curseu and Louwerz (2010).

In summarize, based on the above description which are resulted from evaluating and testing integrated model by structural equation modeling, it is estimated that entrepreneurs' attitudinal characteristics have negative effects on quality of entrepreneurial strategic decision making, while the effects of entrepreneurs' motivational characteristics on quality of entrepreneurial strategic decision making are positive. Furthermore it is estimated that the effects of demographic factors and overconfidence bias on quality of entrepreneurial strategic decision making are positive however representation bias has a negative effect on it.
References


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