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The Impact of Applying Strategic Planning on Iranian SMEs' Performance and Evaluation of Strategic Planning Models Using FBWM

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1. Summary

The current cross-sectional survey study firstly examines how applying strategic planning in Iranian manufacturing small and medium-sized enterprises (SMEs) affects their performance and then in the second part of the research it evaluates strategic planning models using the Fuzzy Best Worst Method. This study evaluates the engagement of Iranian SMEs in strategic planning to ascertain if applying strategic planning affects performance. It also attempts to examine the role of some variables like innovativeness, flexibility, business objectives, etc., in applying strategic planning and business performance. Moreover, this study aims not only to stimulate discussion and raise awareness about the necessity for Iranian SMEs to have a strategic plan for continuation but also to prioritize strategic planning models using Multi-Criteria Decision-Making (MCDM) technique.

A quantitative approach was selected. Primary data for the first section were gathered through 320 questionnaires from individuals working in Iranian manufacturing SMEs. Structured interviews with 13 managers/owners of SMEs were done to collect the primary data for the second section of the current study. The analysis of data was carried out in the first part using the Partial Least Square (PLS) method, Analysis of Variance (ANOVA), and regression analysis and in the second part the Fuzzy Best Worst Method (FBWM) was exploited. Smart PLS, SPSS, Excel, and Lingo 11.0 software were used in the process of analyzing. The result represented that applying strategic planning impacts the Iranian manufacturing SMEs' performance. This is in line with research findings in developed countries. In addition, the outcomes in the second part indicated that based on managers'/owners' judgment Wright's strategic planning model got the first rank to be applied in Iranian manufacturing SMEs. Finally, the author recommends future studies use a longitudinal survey, focusing on homogeneous industries, and applying other Fuzzy MCDM techniques.

2. Research Motivation

Iranian SMEs are extremely important to the manufacturing industry and value chains, as well as to the country's economic growth prospects. This is in line with Suresh and Mohideen (2012), who stated SMEs play a crucial role in the improvement of business activities in a good number of economies. According to Chen (2006); Osinde et al. (2013); Dusko (2014), the foundation of industrialization, income distribution, empowerment, and entrepreneurship is made up of SMEs. However, due to external constraints including a lack of access to financial credit and capital, infrastructural gaps, erratic policies, and enforced sanctions, Iranian SMEs must operate in an extremely unstable and challenging environment. Numerous studies have been conducted in developed economies, where SMEs do not encounter some of these restrictions (Falshaw, 2006; Dibrell et al., 2007; Brown, 2008).

There has been extensive research on the relationship between strategic planning and the performance of SMEs in developed economies. While some of the research reported a positives correlation between strategic planning and SMEs' performance (Andersen, 2000; Kraus et al., 2006; Wilson and Eilertsen, 2010; Campbell, 2010; Vargo and Seville, 2011; Ipinnaiye et al., 2017; Donkor et al., 2018; Haleem et al., 2019; Maldeniya et al., 2021; Thaher and Jaaron, 2022), others proposed no relationships (Kroeger, 2007; Brown, 2008).

My study fills a knowledge gap because previous studies discussed the correlation between strategic planning and the performance of SMEs which are mostly concentrated in developed countries but the current study is done in Iran a developing country. The selection and implementation of a specific strategic planning model may guarantee the survival of SMEs, not only in a chaotic but also in a competitive environment. The fact that nature of the application of strategic planning models is not clear and there is no guidance in this field, many organizations in way of planning are faced strategic problems and suffered significant losses.

So, determining a proper strategic planning model for Iranian manufacturing SMEs can help managers to overcome the problems.
Therefore, it motivated me to investigate the impact of strategic planning on the performance of Iranian manufacturing SMEs in the first section (Part I) and then evaluate/prioritize strategic planning models for Iranian manufacturing small and medium-sized enterprises in the second part (Part II) of my study. After reviewing the literature, the main goals and objectives of my research were determined.

3. Research goals and objectives

On the effects and contributions SMEs make to the Iranian economy, information is available from a variety of sources. It is clear what problems Iranian SMEs face. In light of these, the study of SMEs in Iran is a tenable idea. Supporting small and medium-sized businesses in Iran strengthens the country's economy by creating opportunities for employment, skill development, sources of supplemental income, and entrepreneurial spirit. SMEs make a contribution to innovation and technology development activities and strengthen greatly the supplier network in Iran (Science, Technology, and Innovation Policy Review, 2005).

Even though the majority of Iranian SMEs started with the intention of succeeding and growing, in the lack of realistic strategic and tactical plans, they are prone to resource mismanagement and productivity problems. Even though the majority of Iranian SMEs started with the intention of succeeding and growing, in the lack of realistic strategic and tactical plans, they are prone to resource mismanagement and productivity problems. Therefore, investigating the issue that applying strategic planning effects Iranian manufacturing SMEs' superior performance and determining the rank of strategic planning models for Iranian SMEs are important subjects that should be studied.

Considering the above explanation, the main goals and objectives of my study are as follows:

Main goals:

- Determining the impact of applying strategic planning on Iranian manufacturing SMEs' performance.
- Determining the rank of strategic planning models for Iranian manufacturing SMEs.

Objectives:

- To investigate the impact of dimensions of applying strategic planning (flexibility, innovativeness, planning sophistication, business objectives, strategic planning activities, and engagement with strategic planning) on SMEs performance.
- To investigate the impact of applying strategic planning on dimensions of SMEs performance (financial and non-financial).
- To investigate the impact of flexibility on innovativeness.
- To explore the impact of SMEs features (size and age) on engagement with strategic planning, planning sophistication, and innovativeness.
- To explore the impact of individuals' cultural inclusion and faith on engagement with strategic planning.

4. Methodology

The methodology map (Figure 1) in my study represents that after doing a literature review and collecting secondary data, the research questions were raised. Then, the deductive approach for my quantitative study was selected. After that, a cross-sectional survey strategy was chosen.

Finally, the required data were collected through a questionnaire in part I and a structured interview in part II.

By applying Smart PLS, SPSS, and excel software, the analysis of data in the first part is done using the partial least square (PLS) method, Analysis of Variance (ANOVA), and regression analysis. The analysis of data in the second part is carried out using Ling 18.0 software and the Fuzzy Best Worst method (FBWM).

To collect the required data in part I, a questionnaire consisted of 48 items adopted from Brown's (2008) which confirmed that it was intended to collect information on SMEs' strategic planning features, complexity, performance, and descriptive demographics. Thirty-five new items are added to the original questionnaire to address other aspects such as innovativeness, flexibility,culture, and faith which are part of the novelty of the study.

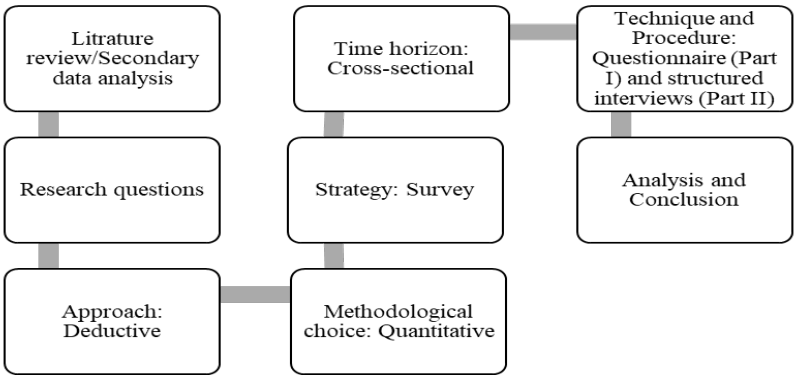


Figure 4.1. Methodology map

According to the Iran Small Industries and Industrial Park Organization (ISIPO), around 33800 SMEs are operating in Iran and 30% of them are active in the manufacturing sector. Due to the large number of SMEs, it was not possible to survey all small and medium-sized enterprises in the country. Accordingly, this study in first place narrowed the research focus to strategic planning and SME performance and then narrowed the study focus to Iranian SMEs operating in the manufacturing sector.

Chin and Newsted (1999) recommended a standard equation (Eq. 4.1) to calculate the minimum required sample size in the research using PLS-SEM is:

$$N = \frac{10 \times max\{m_1. \dots .m_i\}}{R^2} \qquad \text{Equation 4.1}$$

where:

N: minimum sample size

$m_1, \ldots, m_i$: the number of inner or outer model linkage pointing at any latent variable in the model.

R^2: the maximum amount of variance in the endogenous construct explained by the exogenous constructs

The questionnaire was sent to numerous SMEs via emails, short messaging services, social media, and letters, and announced to them that the questionnaire should be filled out by owners, managers, or experts who know the strategic planning of the SMEs.

Because there is a lack of information on the topic in part II, the structured interview was a suitable option to find new and fresh data and reduce variation in responses (Bryman, 2012). Due to time and resource limitations, the structured interview was done only in the province of

Esfahan. I succeed to do face-to-face interviews with thirteen managers and owners of manufacturing SMEs.

5. Summary of results

5.1.Part I

The information obtained through the questionnaire is described using descriptive statistics. Using inferential statistics, research hypotheses and questions are examined and analyzed in Part I. In the second part, the results obtained through the structured interview are analyzed.

According to the descriptive statistics, t The gender of 34% of respondents in the survey are female and 66% are male. 66% of participants in the study are men that 61% of them are 28-37 years old. The education qualification of the majority of respondents (50 %) is master degree. 177 out of 300 organizations are owned by families. More than 70% of organizations that participated in my study are medium enterprises. Most of the enterprises (54%) are 6-10 years old.

Faith or religion has an impact on business decisions in most organizations (54%) and plays a crucial role in business decisions and the success of 70% of organizations. Nearly 80% of the organizations participating in my study agreed that the standard patterns of behavior in society are important to their business.

The majority of the organizations (57.8%) have structured strategic plans. The main objective of 36% of organizations participating in my study is to gain the highest market share. The majority of the organizations (39%) develop their strategic plans through the planning committee and less than 50% use national and international consultants while developing a strategic plan.

Using interferential statistics, all the hypotheses are tested.

The five first (H_1-H_4) hypotheses are examined through structural equation modeling and the partial least square method.

To test these hypotheses using smart PLS software, firstly, the assumptions (evaluation of the measurement model (validity and reliability), structural model assessment, and general evaluation of the model) should be examined. If the model fit, then, the inference could be done.

- Evaluation of measurement model (Validity and Reliability)

To evaluate the measurement model, reliability indices (Cronbach's alpha, Composite Reliability, Loadings), convergent validity, and divergent validity are used. Internal reliability and consistency could be checked by Cronbach's alpha (Cronbach, 1951) and composite reliability (Nunnally, 1978). Values greater than 0.7 are desirable for these indices. In addition, reliability can be tested through factor loadings. It obtains through the correlation value of questions related to one dimension and that dimension itself. If the values ≥ 0.4 the reliability of the model is acceptable (Hulland, 1999). Convergent validity should be checked by Average Variance Extracted (AVE). If the value of AVG>0.5, convergent validity is acceptable (Fornell and Larcker, 1981). To examine divergent validity, the Fornell-Larcker matrix and Cross-Loadings Matrix could be used. In the Fornell-Larcker method, the degree of correlation between the questions of one dimension is compared with other dimensions. If the values on the principal diameter of the Fornell-Larcker matrix are higher than the correlation between them (sub-diameter values), it indicates a suitable divergent validity. In the cross-loading method, the correlation of one dimension with itself and the correlation between the questions of one dimension with other dimensions are compared. If the correlation between a question and another dimension is greater than the correlation between that question and its dimension, the divergent validity of the model is questioned (Hensler et al., 2009).

- Structural model assessment

To evaluate the structural model, the coefficient of determination R^2 and Q^2 are used. R^2 is used to connect the measurement and structural part of structural equation modeling. It shows the effect of an exogenous variable on an endogenous variable. The values 0.19, 0.33, and 0.67 indicate weak, medium, and strong values in the coefficient of determination, respectively (Chin, 1998). Hensler et al. (2009) stated that if one endogenous variable is affected by only one or two exogenous variables, the value of R^2 >0.33 shows a strong relationship between the exogenous dimensions and the endogenous dimension. The Q^2 index is introduced by Stone and Geisser. It determines the predictive power of the model. Hensler et al. (2009) determined the value predictive power of the model as 0.02 (poor), 0.15 (medium), and 0.35 (strong).

- General evaluation of the model

To evaluate the fit of the general model, an index named Goodness of Fit (GOF) is used. Wetzel et al. (2009) introduced three values 0.01, 0.25, and 0.36 as weak, medium, and strong values, respectively, for this index.

If all the assumptions were established, the hypotheses could be tested.

H_1- There is a considerable relationship between applying strategic planning and Iranian SMEs' performance.

All the required assumptions before testing hypothesis H_1 were examined and approved. So hypothesis H_1 could be tested. Structural equation modeling (Figure 5.1) was used to investigate the hypothesis of the impact of applying strategic planning on organizational performance.

Table 5.1. Estimations of coefficients in the model of applying strategic planning and its impact on organization performance

Inner Model	Path Coefficients (Direct Effects)	T Statistics	P Values	Confidence Interval	
				2.5%	97.5%
Applying Strategic Planning -> Performance	0.690	10.633	**0.000***	0.546	0.800

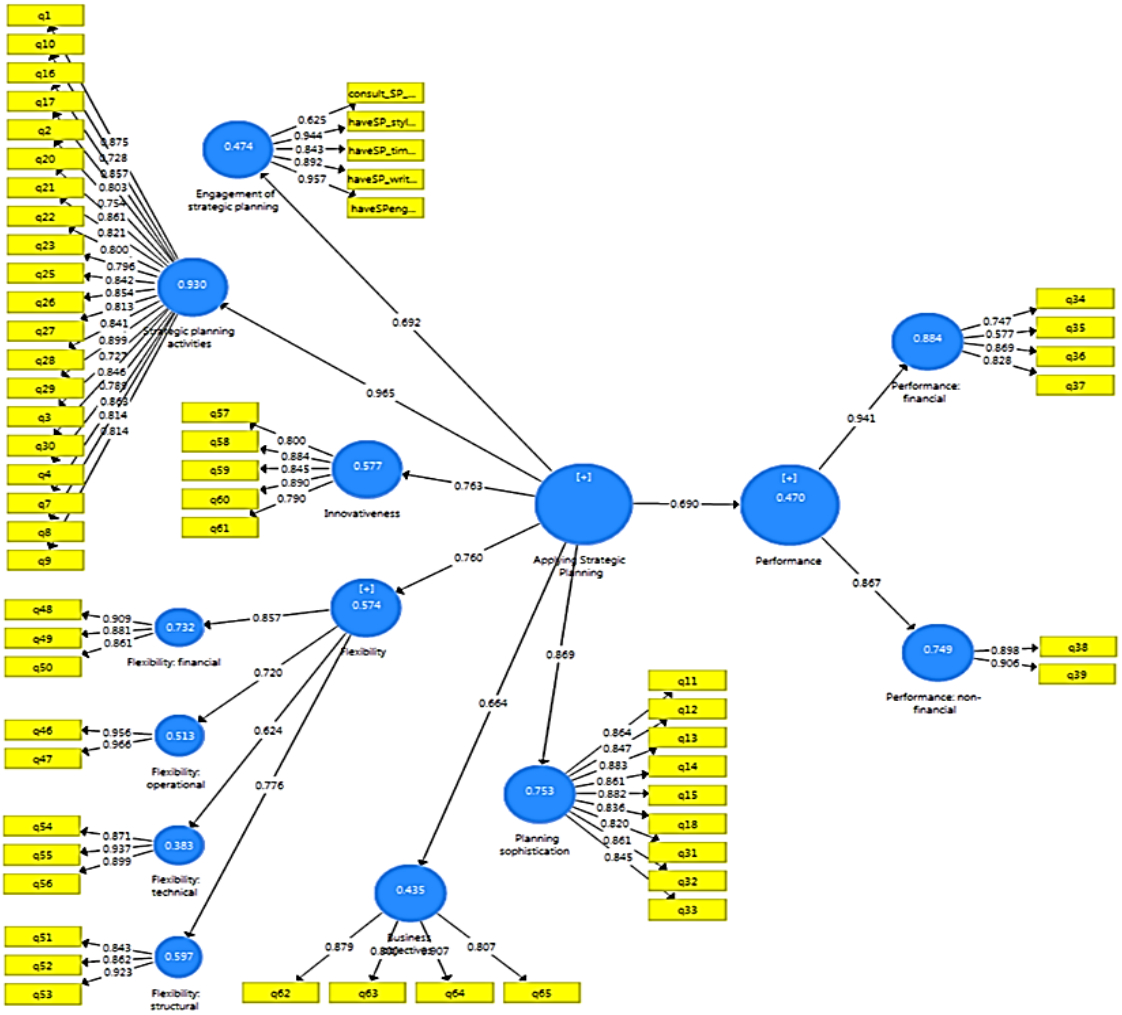


Figure 5.1 Structure Model of Applying Strategic Planning and Its Impact on Organization Performance

Findings: Hypothesis 1 was aimed to test if applying strategic planning has a direct and significant effect on SMEs' performance. With reference to the results in table 4.6, the significance level of the path (Applying Strategic Planning-> Performance) is less than 0.05 (P<0.05) and this path is meaningful. The null hypothesis is rejected and applying strategic planning has a direct and significant effect on performance. It can be concluded that applying strategic planning has a 69% significant direct effect on SMEs' performance. Also, concerning table 4.5, applying strategic planning is 47% effective in determining performance variance (R2=0.470). Therefore, it is proposed that the

H_2- Dimensions of applying strategic planning[1] have a significant impact on Iranian SMEs' performance.

Structural equation modeling (Figure 5.2) was used to investigate hypothesis 2. The structural model was fully reviewed and analyzed. All loadings and model fit indices were

[1] Dimensions of applying strategic planning included: Business objectives, Engagement with strategic planning, Flexibility, Innovativeness, Planning sophistication, Strategic planning activities

confirmed. Therefore, according to the approval of the studied model, the hypothesis can be tested.

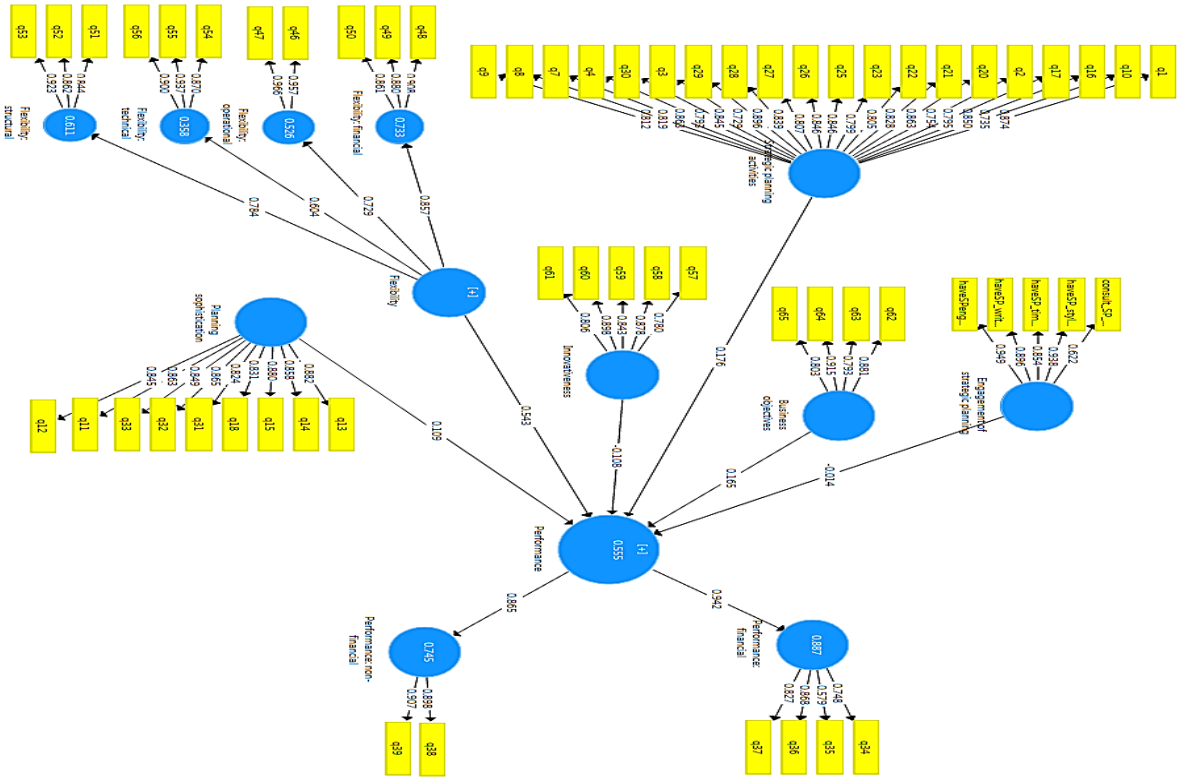


Figure 3.2 Structure model of dimensions of applying strategic planning and its impact on performance

Findings: Hypothesis 2 was put forward to test if dimensions of applying strategic planning (Business objectives, Engagement with strategic planning, Flexibility, Innovativeness, Planning sophistication, and Strategic planning activities) have a direct and significant effect on SMEs' performance. The results of the significant level of the path indicated that business objectives, engagement with strategic planning, planning sophistication, strategic planning activities, and innovativeness to performance is greater than 0.05. These paths are not significant. So, business objectives, engagement with strategic planning, planning sophistication, strategic planning activities, and innovativeness do not have a significant effect on performance separately. However, the significant level of the path (Flexibility -> Performance) is less than 0.05. It shows that flexibility has a significant effect on performance. The direct effect of flexibility on performance is 0.543. It can be concluded that flexibility has a 54.3% direct and significant impact on performance. In addition, flexibility is 29% effective in determining the variance of performance (R^2_partial = 0.543^2). Therefore, the hypothesis is accepted with 95% confidence only in the flexibility dimension. It leads to the conclusion that the more an SME is flexible, the better performance it will have.

H_3- Applying strategic planning has a significant impact on the dimensions of Iranian SMEs' performance.

Structural equation modeling (Figure 5.3) was used to evaluate hypothesis 3. The structural model has undergone careful examination and analysis. All loadings and the model fit indices were confirmed.

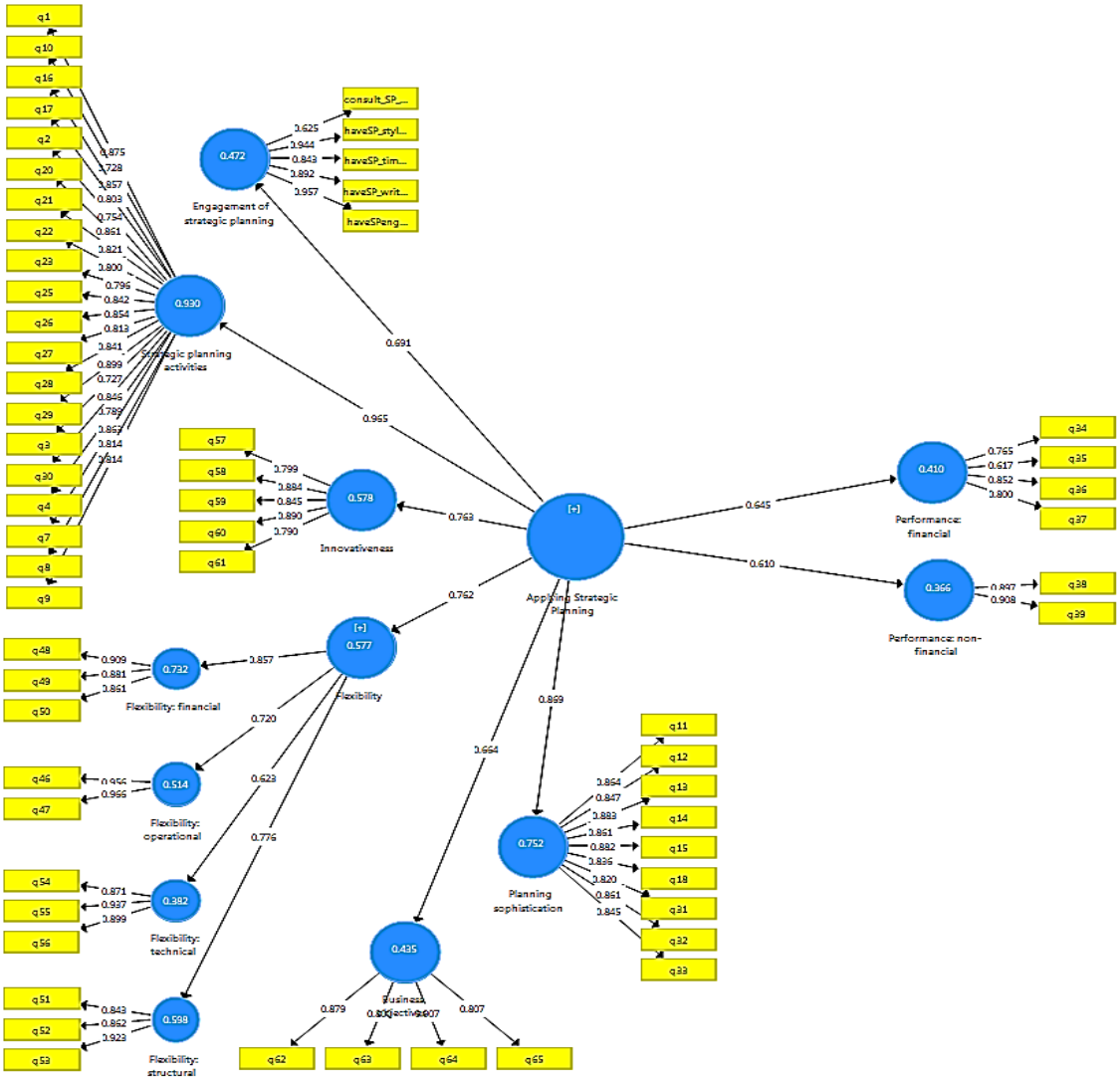


Figure 5.3. Structure model of applying strategic planning and its impact on dimensions of organization performance

Table 5.2. Estimations of coefficients in the model of applying strategic planning and its impact on dimensions of performance

Inner Model	Path Coefficients (Direct Effects)	T Statistics	P Values	Confidence Interval	
				2.5%	97.5%
Applying Strategic Planning -> Performance: financial	0.645	9.261	**0.000 ***	0.503	0.771
Applying Strategic Planning -> Performance: non-financial	0.610	9.598	**0.000 ***	0.478	0.727

*P-Value<0.05

Findings: According to the results in table 5.2, the p-values indicated that the significance level of the paths (Applying strategic planning-> Performance: financial, Applying strategic planning -> Performance: non-financial) is less than 0.05. These paths are significant. Thus, applying strategic planning has a significant impact on both financial and non-financial performance. So, applying strategic planning and its impact on dimensions of organization performance is accepted with 95% confidence. Concerning the direct effect, applying strategic planning has 64.5% direct and significant effects on financial performance and 61% direct and significant effects on non-financial performance. In addition, pointing to the coefficient determination (R^2) values, applying strategic planning is 41% effective in determining the variance of financial performance and 36.6% effective in determining the variance of non-financial performance. It could rise to the conclusion that the more an SME applies strategic planning, the better financial and non-financial performance it will have, respectively.

H_3-There is a considerable relationship between flexibility and innovativeness.

The structural model was fully reviewed and analyzed. All loadings and model fit indices are confirmed. Therefore, according to the approval of the studied model, the hypothesis can be tested. Structural equation modeling (Figure 4) is used to investigate the impact of flexibility on innovativeness in small and medium-sized enterprises.

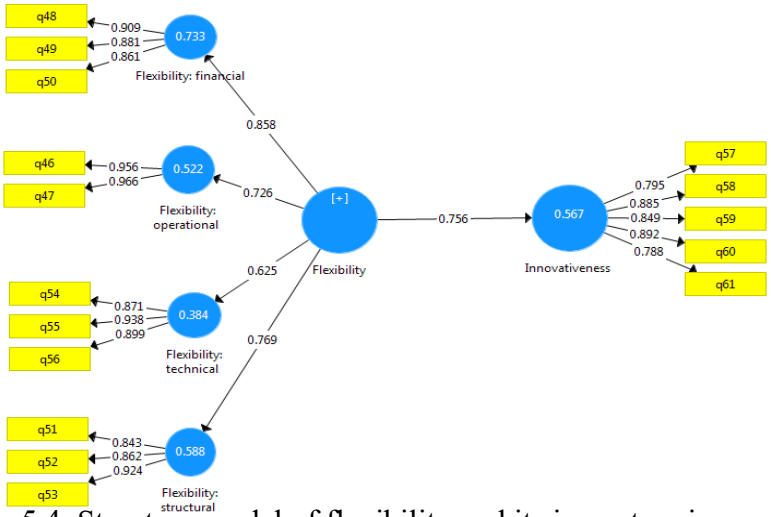


Figure 5.4. Structure model of flexibility and its impact on innovativeness

Findings: Referring to the significance level of the path (flexibility -> innovativeness) which shows a value less than 0.05 (P<0.05), this path is meaningful. Thus, the alternative hypothesis is accepted and flexibility has a direct and significant impact on the innovativeness of SMEs. Given the value of direct effect (0.756), it can be concluded that flexibility has a 75% direct and significant impact on innovativeness. The coefficient of determinations (R^2=0.567) indicates that flexibility is 56% effective in determining the variance of innovativeness. Therefore, it could be assumed that the more an SME is flexible, the more innovative it will be.

To investigate the rest of the hypothesis (H_{5a}-H_{7b}), regression analysis and analysis of variance (ANOVA) are used.

Regression analysis is used to investigate the effect of the continuous predictor (independent) variable on the continuous response (dependent) variable, provided that the distribution of the quantitative response variable is normal. If the significance level is less than 0.05 ($P<0.05$) the hypothesis of the effect of the predictor variable on the response variable is accepted. In regression and Anova analysis, one needs to have a unique score for each of the latent variables (engagement with strategic planning, business objectives, planning sophistication, innovativeness). Each of the latent variables in my study is constructed based on several questions. To define a unique score for each of the latent variables, a factor analysis with only one factor is applied and a factor score for each latent variable is calculated. As an index of all related questions, one can use the factor score in the analysis. Factor scores are standard scores with a Mean=0, Variance = squared multiple correlations (SMC) between questions and factors.

The hypotheses H_{5a}-H_{7b} are investigated by using regression analysis.

Before testing hypotheses, the normality assumption of standardized residuals in regression models must be checked. If the normality was established, the hypotheses could be tested.

The normality assumption of standardized residuals in regression models is examined for hypotheses H_{5a}-H_{7b} using the one-sample Kolmogorov-Smirnov test. Table 5.3 shows the normality of standardized residues in regression models.

The results in table 5.3 indicate that the distribution of standardized residuals in all regression models is normal (the significance level is greater than 0.05 (P-Value>0.05)) except for the effect of the organization's age on engagement with the strategic planning model. The P-Value for the normality test of standardized residuals of the model "organization's age on engagement with strategic planning" is less than 0.05. So, the normality assumption is rejected. However, the sample size is 300, according to the central limit theorem, the average sample distribution is normal.

In addition, the homogeneity of variance assumption in regression analysis is investigated by a scatter plot of the standardized predicted values versus the standardized residuals. This assumption is confirmed due to the random scattering point around zero.

Table 5.3. Normality of standardized residues in regression models using the Kolmogorov-Smirnov test

Standardized Residuals	**Test of Normality**	
Organization's age -> Engagement with the Strategic Planning	Kolmogorov-Smirnov Z	1.47
	p-value	0.025*
Organization's age -> Planning Sophistication	Kolmogorov-Smirnov Z	0.58
	p-value	0.89
Organization's age -> Innovativeness	Kolmogorov-Smirnov Z	0.79
	p-value	0.55
Individual's Culture Inclusion -> Engagement with the Strategic Planning	Kolmogorov-Smirnov Z	0.85
	p-value	0.45
Individual's Religion/Faith -> Engagement with the Strategic Planning	Kolmogorov-Smirnov Z	1.35
	p-value	0.05

*P-Value<0.05

The normality assumption is established. So, the hypotheses could be tested using regression analysis. Table 5.4 indicates the results of regression analysis for hypotheses H_{5a}-H_{7b}.

Table 5.4. Regression analysis of hypotheses H_{5b}, H_{5c}, H_{6b}, H_{7b}

Response / ***Predictor***		*Engagement*	*Planning Sophistication*	*Innovativeness*
Organization's Age	**B**	0.018	0.009	0.004
	Std. Error	0.008	0.008	0.008
	t	2.383	1.094	0.542
	P-value	**0.019***	**0.277**	**0.589**
	R^2	0.055	0.012	0.003
Individual's Culture Inclusion	**B**	0.337		
	Std. Error	0.095		
	t	3.549		
	P-value	**0.001***		
	R^2	0.115		
Individual's Religion/Faith	**B**	0.211		
	Std. Error	0.099		
	t	2.136		
	P-value	**0.035***		
	R^2	0.044		

*P-Value<0.05

H_{5b}- There is a considerable relationship between Iranian SMEs' age and engagement with strategic planning.

Findings: Hypothesis 5b was purposed to test if organization age effect engagement with strategic planning. Before testing this hypothesis, the normality assumption in the regression model was examined. The Kolmogorov-Smirnov test was used to find the normality of the distribution of standardized residuals. If the significance level (p-value) >0.05, the null hypothesis is accepted i.e., that the distribution of standardized residuals is normal. Although the p-value<0.05 for the row (Organization's age -> Engagement with the strategic planning) in table 4.13 indicates that the distribution of standardized residual is not normal, according to the central limit theorem and homogeneity of variance assumption (figure 4.11) the normality of the distribution is approved. Then, hypothesis 5b was tested. According to the results in table 4.14, the significance level of the regression coefficient is less than 0.05 (P<0.05) i.e., that SMEs' age has a significant effect on engagement with strategic planning. With regards to the regression coefficient, by one unit (year) increase in the SME's age, engagement with strategic planning will increase 0.02 on average. Furthermore, the SME's age is 5.5% effective in variance determination of engagement with strategic planning (R^2=0.055). In conclusion, the more SMEs age, the more engagement with the strategic plan.

H_{5c}- There is a considerable relationship between individual's cultural inclusion, faith and engagement with strategic planning.

Findings: Hypothesis 5c was raised to test whether individual's cultural inclusion and faith affects engagement with strategic planning. The results in table 4.13 indicate that the distribution of standardized residuals is normal for Individual's culture inclusion and Individual's faith -> Engagement with the strategic planning since the p-value>0.05. So, it is possible to test the hypothesis. The results of regression analysis in table 4.14 display that an individual's cultural inclusion and faith has a significant impact on engagement with strategic planning since the significance level of the regression coefficient is less than 0.05). Considering the regression coefficient, with a one-unit increase in cultural inclusion, engagement with strategic planning will increase by 0.33 on average, and, with a one-unit increase in individual's faith, engagement with strategic planning will increase by 0.21 on average. In addition, culture inclusion is 11% effective in variance determination of engagement with strategic planning (R^2=0.11) and individual's faith is 4.4% effective in variance determination of engagement with strategic planning (R^2=0.044). It can be offered that the more the cultural inclusion and faith of an individual in an organization, the more engagement with the strategic planning.

H_{6b}- There is a considerable relationship between Iranian SMEs' age and planning sophistication.

Findings: Hypothesis 6b was determined to test if SMEs' age affects planning sophistication. The normality of the distribution of standardized residuals was calculated. The p-value >0.05 in table 4.13 represents that the distribution of standardized residuals is normal. Therefore, hypothesis 6b is allowed to be tested. Testing the hypothesis by using regression analysis, the null hypothesis is accepted because the p-value > 0.05 (see table 4.14). It means that the organization's age does not have a significant effect on planning sophistication.

H_{7b}- There is a considerable relationship between Iranian SMEs' age and innovativeness.

Findings: Hypothesis 7b was put on the table to test if SMEs' age impacts innovativeness. The normality assumption was examined through the test of Kolmogorov-Smirnov and the gained p-value was greater than 0.05. The null hypothesis was accepted and the distribution of standardized residuals was normal. So, the hypothesis could be tested. Using regression analysis to test this hypothesis, the gained p-value is greater than 0.05 (see table 4.14). It represents that the alternative hypothesis is rejected. That is to say, organization age does not have a significant impact on innovativeness.

The hypotheses (H_{5a}, $H_{6a,}$ H_{7a}) are investigated by using parametric analysis of variance. To investigate the impact of a qualitative variable on a quantitative variable, parametric analysis of variance is used provided that the distribution of the quantitative variable is normal at

different levels of the qualitative variable. If the significance level is less than 5% (P<0.05), the hypothesis effect of the qualitative variable on the quantitative variable is accepted.
Table 5.5 represents the normality assessment of response variables at different levels of predictor variables.

Table 5.5. Assessing normality of response variables at different levels of predictor variables.

			Engagement With the Strategic Planning	**Planning Sophistication**	**Innovativeness**
Organization Size	Small	Kolmogorov-Smirnov Z	0.914	0.515	0.886
		p-value	0.374	0.953	0.413
	Medium	Kolmogorov-Smirnov Z	1.556	0.769	1.173
		p-value	0.016*	0.595	0.128

*P-Value<0.05

The results in Table 5.5 have represented that the normality assumption is rejected in engagement with strategic planning in the category of medium for organization size (P-Value<0.05). Since the sample size in these categories is 216, according to the central limit theorem, the average sample distribution of this variable is normal, however. Therefore, to test all the hypotheses in this section, the parametric analysis of variance is used.

Table 5.6. Results of variance analysis for investigating the effect of categorical predictor variables on response variables

Response variable: Engagement With the Strategic Planning		N	Mean	Std. Deviation	95% Confidence Interval for Mean		F	p-value
					Lower Bound	Upper Bound		
Organization's Size	**Small**	84	-0.05	0.187	-0.43	0.33	0.096	0.757
	Medium	216	0.19	0.118	-0.21	0.25		
Response Variable: Planning Sophistication								
Organization's Size	**Small**	84	0.099	0.182	-0.27	0.47	0.386	0.536
	Medium	216	-0.038	0.119	-0.27	.20		
Response Variable: Innovativeness								
Organization's Size	**Small**	84	0.103	0.196	-0.29	0.50	0.418	0.520
	Medium	216	-0.040	0.117	-0.27	0.19		

H_{5a}- There is a considerable relationship between Iranian SMEs' size and engagement with strategic planning.

Findings: Hypothesis 5a was designed to test if SMEs size impacts engagement with strategic planning. Before testing the hypothesis, the normality assumption of response variables at different levels of predictor variables was checked by using the Kolmogorov-Smirnov test. Although the normality assumption is rejected (see table 5. 5) in engagement with strategic planning in the category of medium for organization size (p-value>0.05), according to the central limit theorem it was accepted. So, the hypothesis could be tested. With reference to the results of the analysis of variance (Table 5. 6), no significant effect was observed between organization size and engagement with strategic planning since the significance level of the variance analysis is more than 0.05. Therefore, organization size has no effect on engagement with strategic planning. However, according to the mean value in table 5.6, engagement with strategic planning in medium organizations is more than in small organizations

H_{6a}- There is a considerable relationship between Iranian SMEs' size and planning sophistication.

Findings: Hypothesis 6a was put forward to test if SME size impacts the complexity of planning. The normality assumption was checked. According to the results in table 5. 5 (planning sophistication column and category of organization size), the p-value>0.05 i.e. the normality assumption is kept. Then, the hypothesis was tested by analysis of variance. The result of a significant level in analysis of variance for organization size and planning sophistication indicated that organization size does not have any significant effect on planning sophistication. However, the mean value in table 5.6, shows that planning in small enterprises is more sophisticated than planning in medium ones.

H_{7a}- There is a considerable relationship between Iranian SMEs' size and innovativeness.

Findings: Hypothesis 7a was posited to test if organization size affects innovativeness. Normality assumption was done by using the Kolmogorov-Smirnov test. Pointing to the results in table 5.5, the significance level of the response variable (innovativeness) at a different level of the predictor (organization size) variable indicates that they are significant since the p-value>0.05. As a result, the normality assumption is satisfied. Testing the hypothesis by using analysis of variance, brought about the result that organization size does not impact innovativeness (p-value>0.05, see table 5.6). Nevertheless, considering the mean value in table 5.6, it can be concluded that small organizations are more innovative than medium ones.

5.2.Part II

Evaluating and prioritizing strategic planning models using Fuzzy Best Worst Method.

To answer the main question in the second part of the current study which is evaluating and prioritizing strategic planning models in Iranian manufacturing SMEs, the author is motivated to apply one of the new methods of Multi-Criteria Decision-Making techniques "FBWM" for analyzing the problem. Generally, in the MCDM techniques, at first evaluation criteria should be determined. Calculation of criteria weights is the next step. Then, each alternative should be evaluated based on each criterion. Finally, multiplying the weights of criteria and alternatives provides the final rank of alternatives.

Referring to Rumlet (1980), Mellalieu (1992), Whelan and Sisson (1993), and Cox (1997) six criteria (formality, clarity, measurability, objectivity, coverage, and consistency) are selected to evaluate strategic planning models. Six strategic planning models (Bryson (1988), Wright (Sobhanallahi et al., 2016), Wheelen and Hunger (2012), Hill and Jones (Hill, et al., 2014), Bowman and Asch (1989), and David (David, 2011)) are considered to be evaluated based on the six criteria. Thirteen managers were interviewed in small and medium-sized enterprises to collect the required data.

According to the FBWM, firstly, managers were asked to select the best (C_B) and the worst (C_W) criterion. In the next step, managers compared the best criterion to the others and others to the worst based on 5-scale linguistic terms such as Equally Important (EI), Weakly Important (WI), Fairly Important (FI), Very Important (VI), and Absolutely Important (AI) (Guo and Zhao, 2017). Then, the manager's verbal evaluation should be translated into fuzzy values (Triangular Fuzzy Numbers) (Lootsma, 1980; Van Laarhoven and Pedrycz,1983). In solving non-linear programming, the weights of criteria are calculated. Finally, the final rank of the alternative could be gained by multiplying fuzzy criteria weights by the fuzzy value of alternatives.

The calculation procedure is described as follows:

Step1. Comparison of best criterion to the others and others to the worst.

Managers were asked to rate the importance of the best criterion to others and others to the worst using the linguistic terms Equally Important (EI), Weakly Important (WI), Fairly Important (FI), Very Important (VI), or Absolutely Important (AI).

Table 5.7, and 5.8 shows the judgment comparison of the best criterion to the others and others to the worst by the 13 managers in Iranian manufacturing SMEs.

Table 5.7. Comparison of best criterion to the others

	Criteria / **Best Criterion (C_B)**	**Formality C1**	**Clarity C2**	**Measurability C3**	**Objectivity C4**	**Coverage C5**	**Consistency C6**
Manager 1	C2	VI	EI	EI	FI	VI	VI
Manager 2	C3	FI	VI	EI	VI	FI	AI
Manager 3	C1	EI	FI	FI	FI	VI	EI
Manager 4	C1	EI	AI	FI	FI	VI	FI
Manager 5	C1	EI	FI	FI	VI	VI	AI

Manager 6	C6	FI	FI	AI	EI	FI	EI
Manager 7	C5	EI	WI	FI	VI	EI	VI
Manager 8	C1	EI	VI	FI	FI	AI	FI
Manager 9	C3	FI	FI	EI	FI	VI	FI
Manager 10	C1	EI	FI	FI	FI	VI	FI
Manager 11	C3	VI	VI	EI	AI	VI	FI
Manager 12	C3	EI	FI	EI	FI	AI	EI
Manager 13	C6	VI	VI	FI	AI	VI	EI

Table 5.8. Comparison of the other criteria to the worst

	Manager 1	*Manager 2*	*Manager 3*	*Manager 4*	*Manager 5*	*Manager 6*	*Manager 7*	*Manager 8*	*Manager 9*	*Manager 10*	*Manager 11*	*Manager 12*	*Manager 13*
Worst Criterion (Cw) / ***Criteria***	**C5**	**C6**	**C4**	**C2**	**C6**	**C3**	**C6**	**C5**	**C4**	**C5**	**C4**	**C6**	**C4**
Formality (C1)	FI	VI	VI	AI	AI	VI	FI	AI	FI	VI	FI	VI	FI
Clarity (C2)	AI	FI	EI	EI	FI	VI	FI	VI	FI	FI	FI	FI	FI
Measurability (C3)	AI	AI	EI	VI	FI	EI	EI	FI	VI	FI	AI	EI	FI
Objectivity (C4)	FI	FI	EI	VI	FI	FI	EI	FI	EI	FI	EI	EI	EI
Coverage (C5)	EI	FI	WI	FI	FI	FI	VI	EI	WI	EI	FI	VI	FI
Consistency (C6)	FI	EI	FI	VI	EI	AI	EI	VI	FI	FI	VI	EI	AI

The fuzzy values of best criterion to the others and other to the worst should be done by transferring the linguistic terms by in table 5.9.

Table 5.9.Linguistic terms transformation rules

Linguistic terms	**Equally importance (EI)**	**Weakly important (WI)**	**Fairly important (FI)**	**Very important (VI)**	**Absolutely important (AI)**
Membership Function *(l, m, u)*	(1,1,1)	$(^2/_3, 1, ^3/_2)$	$(^3/_2, 2, ^5/_2)$	$(^5/_2, 3, ^7/_2)$	$(^7/_2, 4, ^9/_2)$

Step 2. Calculating the consistency ratio of pairwise comparison

The consistency ratio of pairwise comparison was assessed using Guo and Qi (2021) input-based consistency measurement method. The formula for the input-based consistency ratio is as follows:

$$CR^I = \max_j CR_j^I \qquad \text{Eq(1)}$$

where

$$CR_j^I = \begin{cases} \left| \dfrac{R(\tilde{a}_{Bj} * \tilde{a}_{jW} - \tilde{a}_{BW})}{R(\tilde{a}_{BW} * \tilde{a}_{BW} - \tilde{a}_{BW})} \right| & \tilde{a}_{BW} \neq (1,1,1) \\ 0 & \tilde{a}_{BW} = (1,1,1) \end{cases} \qquad \text{Eq(2)}$$

CR^I: global input-based consistency ratio for all criterion
CR_j^I: level of local consistency related to the criterion
$\tilde{a}_{Bj}$: the fuzzy value of best criterion over j[th] criterion
$\tilde{a}_{jW}$: the fuzzy value of j[th] criterion over the worst

The results have shown that there is consistency in all pairwise comparisons in my study.

Step 3. Calculating criteria weights

To find criteria weights, the below non-linear programming model is proposed (Amiri et al., 2020):

$$\text{Min} \sum_i \tilde{\xi}_i$$

$$\text{s.t.} \begin{cases} \left| \frac{\widetilde{W}_B^i}{\widetilde{W}_j^i} - \tilde{a}_{Bj}^i \right| \le \tilde{\xi}_i \\ \left| \frac{\widetilde{W}_j^i}{\widetilde{W}_W^i} - \tilde{a}_{jW}^i \right| \le \tilde{\xi}_i \\ \sum R(\widetilde{W}_j^i) = 1 \\ \widetilde{W}_j^i \ge 0 \\ \mu_j = \frac{\sum R(\widetilde{W}_j^i)}{d} \end{cases} \quad \forall \text{i} , \forall \text{j} \quad . \quad \forall \text{j}$$

$$R\left(\widetilde{W}_j^i\right) = \frac{l_j^i + 4 * m_j^i + u_j^i}{6}$$

where $\widetilde{W}_B^i = (l_B^i, m_B^i, u_B^i)$,$\widetilde{W}_W^i = (l_W^i, m_W^i, u_W^i)$,$\widetilde{W}_j^i = (l_j^i, m_j^i, u_j^i)$, $\tilde{a}_{Bj}^i = (l_{Bj}^i, m_{Bj}^i, u_{Bj}^i)$, $\tilde{a}_{jW}^i = (l_{jW}^i, m_{jW}^i, u_{jW}^i)$, $\tilde{\xi}_i = (k_i^*, k_i^*, k_i^*)$
$i \in D = \{1,2, \dots ,13\}$: indices of decision makers (managers);
$j \in C = \{1,2, \dots ,6\}$: indices of criteria
$l \in A = \{1,2, \dots ,6\}$: indices of alternative
B: indices of the best criterion
W: indices of the worst criterion
$\widetilde{W}_B^i$: the fuzzy weight of the best criterion for the i[th] decision maker
$\widetilde{W}_W^i$: the fuzzy weight of the worst criterion for the i[th] decision maker
$\tilde{\xi}_i$: the fuzzy dependent variable of consistency ratio for the i[th] decision maker
$\widetilde{W}_j^i$: the fuzzy weight of criterion j for the i[th] decision maker
μ_j: aggregated weight of criterion j
$\tilde{a}_{Bj}^i$: the fuzzy value of best criterion over j[th] criterion for i[th] decision maker
$\tilde{a}_{jW}^i$: the fuzzy value of j[th] criterion over the worst for i[th] decision maker
Solving the model by applying Lingo 18.0 software, the final weights of each criterion are gained.

Analysis of criteria: criterion C_1 (formality) got the highest weight (0.202) and criterion C_4 (objectivity) gained the lowest weight (0.114). It means that formality is the most important criterion and objectivity is the least important criterion in evaluating strategic planning models from the point of view of managers/owners in Iranian manufacturing SMEs. The final weights of criteria are as follows: $\mu_1 > \mu_2 > \mu_3 > \mu_6 > \mu_5 > \mu_4$.

Step 4. Determining fuzzy values of strategic planning models

To find the final fuzzy values of strategic planning models, one can use equations 3-5.

The normalized value of alternative l for criterion j assigned by i[th] decision maker for positive and negative criteria equations 4, 5 could be employed, respectively (Amiri et al., 2020; Kheybari et al., 2019):

$$\tilde{V}_l^i = \sum_{j=1}^{n} \mu_j \tilde{p}_{lj}^i \quad \text{for all l} \qquad \text{Eq(3)}$$

$$\tilde{p}_{lj}^i = \frac{\tilde{x}_{lj}^i}{\sum_j \tilde{x}_{lj}^i} \quad , \quad \text{for positive criteria} \qquad \text{Eq(4)}$$

$$\tilde{p}_{lj}^i = \frac{\frac{1}{\tilde{x}_{lj}^i}}{\sum_j \frac{1}{\tilde{x}_{lj}^i}} \quad , \quad \text{for negative criteria} \qquad \text{Eq(5)}$$

$$\tilde{x}_{lj}^i = (a_{lj}^i, b_{lj}^i, c_{lj}^i)$$

where

μ_j : aggregated weight of criterion j,

$\tilde{p}_{lj}^i$: the normalized value of the alternative l for criterion j assigned by i[th] decision maker

$\tilde{x}_{lj}^i$: the value of alternative l for criterion j for the i[th] decision maker

Managers were asked to what extent strategic planning models cover the (formality, clarity, measurability, objectivity, coverage, and consistency) criteria.

They must reply to the question using linguistic terms (Very Low (LV), Low(L), Moderate(M), High(H), Very High (VH)). Transferring the linguistic terms by using table 5.10, the fuzzy values of each strategic planning model based on each criterion were determined.

Table 5.10. Linguistic variables transformation rules

Linguistic terms	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
TFN	(0,0.1,0.3)	(0.1,0.3,0.5)	(0.3,0.5,0.7)	(0.5,0.7,0.9)	(0.7,0.9,1)

Retrieved from Tavana et al. (2021)

Since all the criteria are positive, equation 4 was used to normalize the alternative values with regard to each criterion. The final fuzzy value of each strategic planning model ($\tilde{V}_l^i$) for each manager was obtained through equation 3.

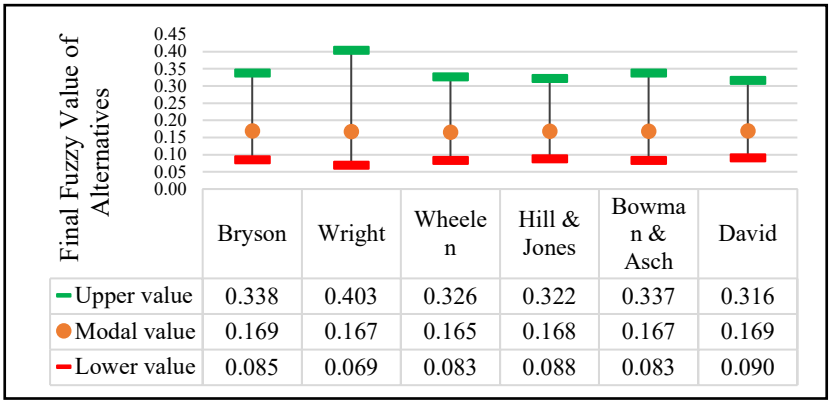
Bryson's strategic planning model got the highest value from the managers' 6 and 8 points of view. Wright's strategic planning model from the manager's 10 points of view has obtained the highest score in the upper value. With regards to the upper values, there is a significant difference in the value of Wright's strategic planning model between managers 10 points of view and other managers. Mangers 4, 8, and 9, respectively, are the big fan of the Wheelen strategic planning model. Hill and Jones strategic planning model got the highest upper value from manager 2 and manger 10 standpoints, respectively. Managers 9, 10, and 4, respectively, showed more tendency toward the Bowman and Asch strategic planning model compared to the other manager's points of view. There were no significant differences between the managers' points of view regarding the David strategic planning model. It can be concluded that David's strategic planning model got the same value from all managers' standpoints.

Step 5. Evaluating and prioritizing strategic planning models

The final fuzzy rank of strategic planning models should be calculated by integrating all the fuzzy values. In line with Dong et al. (2010); Wu et al. (2010); Anojkumar et al. (2014); Gupta et al. (2019); Liu et al. (2019); Norouzi and Namin (2019); Guo and Qi (2021); Haseli et al. (2021), geometric mean is used in the current study to integrate fuzzy values of strategic planning models. This method avoids using extreme value to affect the whole situation.
The geometric average is described as the product of the n[th] root of the products of values, where n is the number of values. A data collection of values $\{v_1, v_2, \dots, v_n\}$ is given by its geometric average, GA. The calculation of the geometric mean for a data set like $\{v_1, v_2, \dots, v_n\}$ is as follows (Yousefi and Carranza, 2015):

$$G_A(v_1, v_2, \dots, v_n) = \left(\prod_{i=1}^{n} v_i\right)^{1/n} = \sqrt[n]{v_1 . v_2 . \dots . v_n} \qquad \text{Eq(6)}$$

Applying the geometric mean, the final fuzzy value of alternatives is shown in figure 5.5.



	Bryson	Wright	Wheelen	Hill & Jones	Bowman & Asch	David
Upper value	0.338	0.403	0.326	0.322	0.337	0.316
Modal value	0.169	0.167	0.165	0.168	0.167	0.169
Lower value	0.085	0.069	0.083	0.088	0.083	0.090

Figure 5.5. Final fuzzy value of alternatives

Considering the upper values of models, the strategic planning models are prioritized as follows, Wright ≻ Bryson ≻ Bowman and Asch ≻ Wheelen ≻Hill and Jones ≻ David. Using modal values, the priority of the models is Bryson ≈ David ≻ Hill and Jones≻ Wright ≈ Bowman and Asch ≻ Wheelen, while applying lower value provides totally a different prioritization, David ≻ Hill and Jones≻ Bryson≻ Wheelen≈ Bowman and Asch≻ Wright.

Step 6. Defuzzification of fuzzy vales

To reach a crisp value of alternatives, defuzzification of fuzzy results is required. Using equation 10, the final value of alternatives is obtained as it is shown in table 5.11.

$$\text{If} \quad \tilde{a}_j = l_j + m_j + u_j \quad \rightarrow \quad R(\tilde{a}_j) = \frac{l_j + 4 * m_j + u_j}{6} \qquad \text{Eq(10)}$$

$\tilde{a}_j$: real fuzzy number
l_j: lower bound
m_j: median
u_j: upper bound

Table 5.11. Final alternative values

	Crisp Value
Bryson	0.183
Wright	0.190
Wheelen	0.178
Hill & Jones	0.180
Bowman & Asch	0.182
David	0.180

Considering the crisp value, the final rank of strategic planning models is as follows:
Wright≻ Bryson≻ Bowman and Asch≻ David≈ Hill and Jones≻ Wheelen
So, the answer to the main question "what is the priority of the strategic planning models in Iranian manufacturing SMEs?" was revealed.

Findings: The results have shown wright's strategic planning model which is an applied model placed the first priority based on the managers' point of view in Iranian manufacturing SMEs and Bryson, Bowman and Asch, David, Hill and Jones, and Wheelen in the next priority, respectively. Wright's strategic planning model in comparison to the other models in the study is not too sophisticated, and it is easy to understand for both managers and employees in SMEs. It can be concluded that managers in Iranian manufacturing SMEs tend to the model which is not only practical but also easy to use.

6. Application fields of research findings

The application of strategic planning results in the superior performance of Iranian manufacturing SMEs in both financial and non-financial aspects, respectively. That is to say, the SMEs who apply strategic planning have higher sales/revenue growth, establish new sites faster, have higher customer growth, and hire more staff in comparison to the other competitors. In addition, the satisfaction and retention of staff in the SMEs are at a higher rate than those SMEs without strategic planning. Therefore, applying strategic planning could help Iranian manufacturing SMEs to succeed in their financial and non-financial performance.

Flexibility in the four aspects of operation, finance, structure, and techniques when applying strategic planning may result in premier performance in Iranian manufacturing SMEs. Hence, flexibility in a strategic plan not only assists SMEs to overcome turbulent economic but also helps in the innovativeness of the SMEs. If an SME is flexible in different aspects, it may accept new innovative ideas and opinions. Therefore, the more flexible an Iranian manufacturing SME, the more innovative.

Engagement with strategic planning will increase when the age and size of an SME increase. Iranian manufacturing medium-sized enterprises that have been working for a long time have shown more engagement with applying strategic planning. Engagement with strategic planning indicates whether an SME is empirically involved with a strategic plan. Accordingly, it is recommended to those small Iranian manufacturing enterprises, that have not yet adopted strategic planning, to accept and apply strategic planning to the aim of superior performance. Individuals' cultural inclusion and religion are the factors that impact directly the engagement of Iranian manufacturing SMEs with strategic planning. Respecting others, being on time, a

mutually friendly relationship between managers and employees, dedication to the job, and religion are the cultural inclusions that have also been taken into account in Iranian manufacturing SMEs and have affected engagement with strategic planning. The results of my study represented that individual cultural and religious inclusions result in more engagement with strategic planning. Consequently, developing individuals' cultural and religious inclusion will assist an SME in better engaging with strategic planning.

According to the results of my study, Iranian manufacturing small enterprises sometimes may have more complex plans in comparison to medium enterprises. Although a sophisticated plan may indicate that a small enterprise has various business objectives and as a result uses strategic planning, planning sophistication may cause the enterprise to encounter some problems that are not possible to solve easily. As a result, the small enterprise may fail and cannot continue its activity. However, innovativeness can help small enterprises to solve problems and overcome difficulties.

Last but not least, although many authors and creators of strategic planning models expressed that all kinds of models can be used depending on the situation, there is a fact that the nature of the application of strategic planning models is not clear, and no guidance. In this context, some organizations particularly SMEs in the way of planning is faced strategic problems and suffered significant losses. Hence, the SMEs' managers/ owners are concerned to determine and use suitable strategic planning for their organizations. Considering the issue as a multi-criteria decision-making problem, in my study, six different strategic planning models based on six criteria were assessed based on managers'/owners' judgments and using the fuzzy best-worst method. Wright's strategic planning model, which is a simple and practical model, was placed as the first priority for applying in Iranian manufacturing SMEs. This model assists enterprises to analyze the industry and external environment. Then determine the mission and goals and formulate their strategies in the three levels of management, activity, and function. The strategies would be implemented after determining responsibilities, tasks, legal duties, and culture. The evaluation and control of the whole process is the final step of the model. On that account, Iranian manufacturing SMEs can use Wright's strategic planning model. But if they are not sure that the model is helpful in their organizations, they can select different strategic planning models and use the fuzzy best-worst method to find an appropriate model for implementation in their organizations.

7. List of publication

1	**Ajripour, I.,** *Applying a Hybrid MCDM Technique in Warehouse Management. Vezetéstudomány/Budapest Management Review, 2022, https://journals.lib.uni-corvinus.hu/ (It will be published in November 2022 forthcoming issue).*
2	***Ajripour, I.***, Molnar, V., A Case Study in Strategic Decision Making Using Multi-Criteria Decision Making and Balanced Scorecard. International Journal of Applied Decision Sciences, 2022, ISSN 1755-8085 (Electronic). DOI: 10.1504/IJADS.2022.10045461
3	***Ajripour, I.***, "Supplier Selection during Covid-19 Pandemic Situation by Applying Fuzzy TOPSIS Method: A Case Study", Acta Universitatis Sapientiae, Economics, and Business journal, 2022, https://sciendo.com/journal/AUSEB (It will be published in November 2022 forthcoming issue).
4	***Ajripour, I.***, "AN APPLICATION OF ANALYTIC HIERARCHY PROCESS FOR SELECTING THE BEST SUPPLIER", The PhD forum organized by the University of Miskolc Faculty of Economics, November 2020. (In proceedings)
5	***Ajripour, I***., Ranjbar, S., "MULTI-CRITERIA CLASSIFICATION OF SPARE PARTS - CASE STUDY", International conference on Decision making for Small and Medium-Sized Enterprises (DEMSME 2021), School of Business Administration in Karvina at Silesian university in Opava, May 13- 14th 2021. *https://demsme.opf.slu.cz/conference-proceedings*
6	***Ajripour, I.,*** "Applying Linear Assignment Method in assessing suppliers during COVID-19 pandemic situation- Case study", 4th Smart Communities Academy: Building Smart Communities for the Future-International Conference at Technical University of Kosice-Slovakia, October 7-8th 2021. http://smartcommunities.eu/en/activities/smart-communities-2-0/smart-academy/4-th-smart-communities-academy
7	***Ajripour, I***., Alamian, R., Comparing Green Economy in Iran with OECD Asian Countries by Applying TOPSIS and GI Method. THEORY METHODOLOGY PRACTICE: CLUB OF ECONOMICS IN MISKOLC, 2021, 17 (1). pp. 15-26. ISSN 1589-3413 (print); 2415-9883. http://real.mtak.hu/127425/
8	***Ajripour, I.***, "Applying MCDM Technique in analyzing the effect of promotion items based on online shopping factors: A case study", The European Union's contention in the reshaping global economy organized by the University of Szeged Faculty of Economics and Business Administration, 2020. *http://acta.bibl.u-szeged.hu/71538/*
9	***Ajripour, I***., Asadpour, M., Tabatabaie, L. A model for organization performance management applying MCDM and BSC: a case study. Journal of Applied Research on Industrial Engineering, 2019; 6(1): 52-70. doi: 10.22105/jarie.2019.171886.1080

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