CONFIRMATORY FACTOR ANALYSISOF STRATEGIC CONTROL SYSTEM IN MALAYSIA AUTOMOTIVE INDUSTRY

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Abstract
In the globalization era, Malaysian automotive industry is facing greater challenges due to the general quest for high quality, the local and international requirement and regulation and the increasing competition between local car and foreign car manufactures. Therefore, to increase the competitiveness, companies must implement and maintain quality initiatives such as Balanced Scorecard (BSC) in order to compete between local, regional, and global market. The Balanced scorecard strategy helps managers to manage strategic plan, monitor and control the performance result, encourages effective communication and discussion, provides reward based system, and feedback with quick action approach that align with organization goal. Managers need to focus on both, not only for multiple performance measurement, but also Strategic Control Systems (SCS) to achieve organizational goals. This research reviews the SCS literature and proposed four con-structs with the underlying items of clarifying and translating vision and strategy, communicating and linking, planning and target setting and strategic feedback. Data were obtained from 252 top management of Malaysian automotive industry. This paper presents finding of Exploratory Factor Analyses (EFA), Confirmatory Factor Analysis (CFA), and reliability analysis empirically verified and validated. The results indicate that four SCS constructs are acceptable for further analysis. The paper with a proposed future direction ends of this research.

Keyboard: Balanced scorecard, strategic control system, structural equation model, confir matory factor analysis, and automotive.

Introduction

The automotive industry is one of the most important and strategic industries in Malaysia manufacturing sector (Zadry, 2005; Amrina, 2009). However, recently, Malaysian automotive industry is facing greater challenges due to the general quest for high quality, the requirement and regulation of ASEAN Trade Area (AFTA) and the increasing competition between local car foreign car manufactures. Therefore, to increase the competitiveness, firms apply many quality program and initiatives such as Total Quality Management (TQM), lean, six sigma Balanced Scorecard (BSC) and so on.

BSC is viewed in different perspective by various authors such as strategic management tool (Rooriguez, 2008), strategic diagnostic tool (Sidiropoulos et al., 2004), strategic implementation tool (Andersen et al., 2004), or strategic management system (Kaplan and

Norton, 1996a,b). However Kaplan and Norton (1992) argued that BSC is not only performance measurement, but also it aligns organizations with Strategic control system (SCS) which directly translate an organization's strategies into action oriented plans. In addition to that, Kaplan and Norton (1996a,b) developed strategic management system as shown in figure 1.

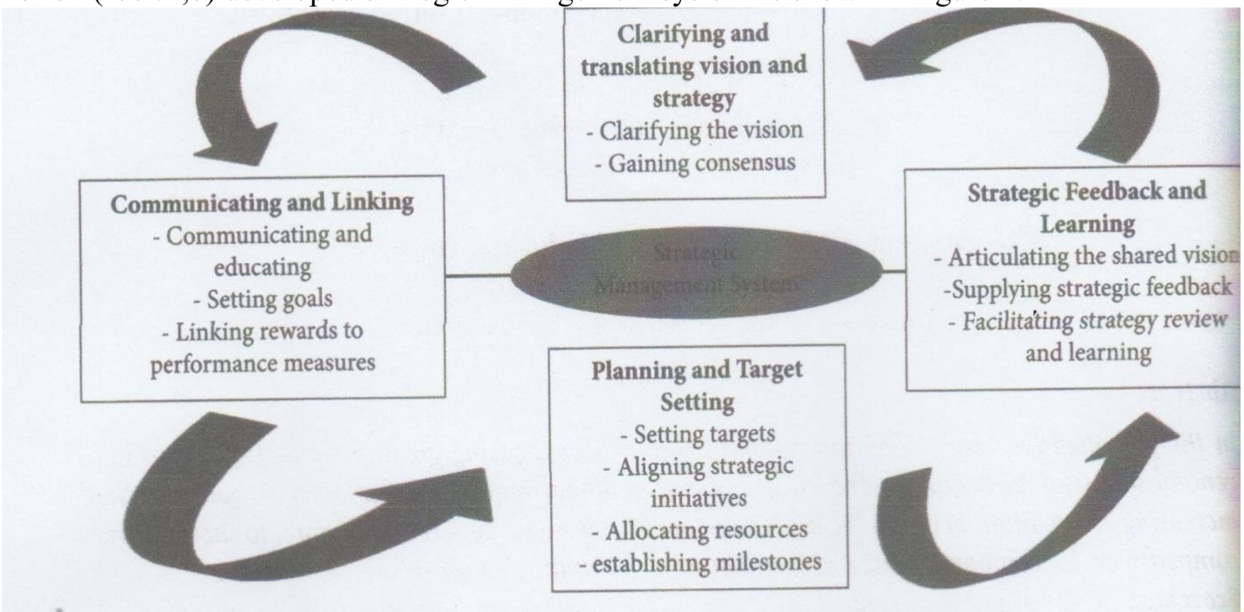

Figure 1: Strategic management systems (Kaplan & Norton, 1996)

Literature Review

According to Schendel and Hofer (1979) SCS is defined as the strategy implementation which needs to strategically developed strategies and action plan, analyse performance result, and continuous feedback involvement. While, Goold and Quinn (1990) similarly define it as Schendel and Hofer (1979) which note that SCS as strategic planning which need to control and monitor the process of involving all level management, performance measurement system, feedback effort, and reward system that are aligned with organizational goal. Some of these definitions are summarized in Table 1.

Therefore, in other word, SCS is a structural system that authorizes and help managers to manage strategic plan, monitor and control the performance result, encourages effective communication and discussion, provides reward based system, and feedback with quick action approach that aligns with organizational goal.

Table 1: Definition of SCS

Authors	Definition
Schendel and Hofer (1979)	The strategic process of action plan, analyse performance results, and continuous feedback
Goold and Quinn (1990)	The strategic planning of control and monitoring process of involvement, performance measurement, feedback, and reward
Simon (1990)	The strategic process of measure of progress plan, involvement and commitment, and effective communication and discussion

The Elements of Strategic Control System

According to Goold and Quinn (1993), SCS assists managers and organizations by providing a clear set of planning, guideline for setting long term goal, high motivation achieved by managers, key performance indicator and monitoring, and workers' responsibility and empowerment.

Nevertheless, in competitive business and modern work culture and environment, Picken and Dess (1997) argued that SCS requires contemporary approach consists of two elements, namely informational control and behaviour control. In information control, managers are focused to monitor external environment. On other contrary, behavioural control will provide managers to focus more on internal environment and strategic issues.

Kaplan and Norton (1996 a,b) developed strategic control framework as strategic management system which may be used to clarify and gain consensus about strategy, communicate strategy through the organization, align departmental and personal goals to the strategy, link strategic objective to long-term targets and annual budgets, identify and align strategic initiatives, perform periodic and systematic strategic review, and obtain feedback to learn about and improve strategy. Therefore, more detail explanation of BSC framework strategy is shown in Table 2.

Furthermore, Ittner and Larcker (1997) suggested that SCS constitutes of three elements, which are strategy implementation (action plan, project, and reward), internal monitoring (feedback, meeting, management review) and external monitoring (benchmarking, market, and strategic audit). However, other previous study by Flamholtz *et al* ., (1985) proposed some other elements that are vital to implement SCS, like, plan for goal setting, resource management, and focus on outcome, performance measurement and appraisal, feedback, and reward.

Based on extensive review of the literature, this study discovers elements of SCS that have been proposed by various researchers. Therefore, the strategic control framework of BSC by Kaplan and Norton (1996a) is selected because the framework is well-established and recognized in the scholarly literature (Mooraj et al., Otley, 1999; Norreklit 2000; Abas & Ya'acob, 2006) which includes clarifying and translating strategy, communicating and linking, planning and target setting; and strategic feedback and learning. More detailed explanation of SCS is shown in Table 2.

Table 2: The Balanced Scorecard as a strategic control system framework

BSC strategy	Item
Clarifying and translating the vision and strategy	Clarifying Compony`s vision and goals to entire organization and covert it into action to gain consensus.
Communication and linking	Business long term goals and strategy should be communicated from top to botton alignment, employee empowerment and employee reward to achieve better performance.
Planning and target setting	Involves resources management, quality improvement programme, customer preferences and research and development action plans that are needed for successfully implementing the predetermined strategy.
Strategic feedback and learning	By indemnifying the strategic information regarding market and performance review, sharing vision and knowledge, and feedback, an organization can build and crate long-term growth and improvement

(Source: Kaplan and Norton, 1996a)

Strategic Control System: Research and current trends

Daniel and Reitsperger (1991) who examined the relationship between quality and system control strategies studied the relationship between quality strategy and the control systems in 26 Japanese automotive and consumer electronics firms and a total of 459 responses were received. In their study, the element of control systems was measured with the use of quality related elements associated with control system that determines goals and rejects feedback for rework, scrap and downtime. Findings of the study provide empirical evidence that manufacturing following a zero defect quality strategy had modified their control system to encourage continuous quality improvement. Therefore, to ensure successful implementation of quality improvement initiatives towards organizational performance, it must be initatied by adjusting the control system that meets or coincides with the organization strategy.

The earliest study in the field of SCS was initiated by a case study by Goold and Quinn (1993), they found that many of the strategic control practices had a negative relationship with performance. Instead, they found that SCS benefited limit an organization in the development of planning as well as achieving better performance and strategy. Thus, for successful implementation of control strategies, they suggested that objectives of control system and strategic objectives must be aligned. Then, their study identified several SCS factors that can help organization to control strategies and achieve performance, among them are development of accurate and clear plan of what to do, a guide to managers to think specially for the achievement of long-term objectives by thinking what need to be done in the future, motivate managers to better enhance the high level of commitment to the successful implementation of organizational strategic plan, focusing on long-term objectives than just focus on the annual financial objectives and ensuring an excellent field of work through the setting of a clear job responsibilities and empowering better employees empowerment.

Banker et al., (1993) investigated the relationship between the adaptation new manufacturing practices and control system. Sample of 362 workers from 40 plants located in the USA was used. New manufacturing practices in their study refer to Total Quality Management (TQM), Just In Time (JIT), and team work. For control system variables, five construct were operationalized, namely quality information, productivity information, defect charts, schedule compliance chart, and machine breakdown chart. They found that the introduction of new manufacturing practices have influenced the practices of the control system in their studies. On the same stand, they also suggest that changes in the control system is necessary to support the strategy of TQM practices.

An exploratory survey research by Ittnerr and Larcker, (1997) used as many as 249 of the automotive and computer manufactures from Canada, Germany, Japan and the United States. They found that organizations which put more emphasis on building their own quality of their strategic plans tend use better SCS. The study findings also showed strong positive relationship between quality strategy and quality focused control systems. However, some empirical findings find that there is a negative relationship between SCS and performance, and recommend to the organization so that the implementation of the SCS should be able to adjust to a environment. Then, the results of different in the automotive and computer industry also suggest that a better understanding of the SCS is required for successful implementation. In addition, they suggested that the key assumptions on the SCS is necessary to coordinate specific control practices in the selection of organizational strategy.

Research by Sinclair and Zairi (2001) examined the SCS elements which performance measurement is based on the quality and it is only focused in the context of the organization. There are five elements in this performance measurement which, in their case studies, it appears that TQM has affected the control system which are the strategy development and goal deployment, process management and measurement, performance appraisal and management, performance assessment breakpoint, and reward and recognition. Meanwhile, a case study conducted by Anderson et al., (2004) confirms that the TQM strategy can be concluded that the reasons for the failure of TQM implementation is complex, because they argue that the failure is due to the weak relationship between strategy and SCS.

In this regard based on previous studies, this can deduce that the implementation of quality initiatives are more successful when in conjunction with the SCS in the smooth business operations and in further enhance organizational performance. Besides, there are also gaps in their research, including research methodology view, some SCS uses a small sample, especially in the case study (Anderson, 2004). Meanwhile, several empirical studies using only one variable, such as performance measurement that represents a strategic control system (Hoque, 2004). Thus, there is some justification for focusing on this topic. First, most research on operation and management control system has focused on traditional control system such as budgetary control systems (Fisher, 1998), while only a small number of existing research has focused on holistic and comprehensive approach such as the SCS system. Second, strategic control system become important with the implementation of quality practices such as involving the practices of continuous improvement, process management and customer focus (Chenhall, 2003).

SCS Construct

Based on extensive review of the literature, this study discovers different elements of SCS that have been proposed by various researchers. Therefore, the SCS framework by Kaplan and Norton (1996a) is selected as the SCS framework of this study which includes clarifying and translating vision and strategy, communicating and linking, planning and target setting and strategic feedback and learning. Furthermore, these four strategy elements of BSC are strongly supported by previous study (Flamholtz et al., 1985; Goold & Quinn, 1993; Itter & Larcher, 1997; Pinken & Dess, 1997; and Abas & Yaa'cob, 2006). Finally, this research propose measurement item for strategic control system which are: clarifying and translating the vision and strategy, communication and linking, planning and target setting, and strategic feedback and learning as shown in Table 3.

Clarifying and translating strategy

Organizations require strategic system to align organization members to understand organization's vision and quality practice and improvement. In addition, organization members involvement, team work, involvement, collaboration, aligning between operation activities and management, and understanding the organization vision and goal are important factor in order to make organizational strategy more effective. Thus, organization must explain strategy in clear and simple statement to make organization members understand the organization vision and strategy. To achieve organization strategy, top management should translate their vision so that it is easily understood by all level of organization members and ultimately put them into action (Irala, 2007).

Table 3: Strategic control System construct and their measurement item

Strategy control system	Items		Reference
Clarifying and translating the vision and strategy	CTS1	Understanding the strategy	Kaplan and Norton, 1996a; Ittner and Larcker, 1997; Abas and Ya'acob, 2008.
	CTS2	Communication of translated strategy	
	CTS3	Consensus on strategy	
	CTS4	Translation of strategic measure	
	CTS5	Objectives and Task	
Communication and linking	CL1	Linking reward and strategy	
	CL2	Compensation on quality performance	
	CL3	Communication on organizational goal	
	CL4	Communication on strategy	
	CL5	Recognize efforts	
	CL6	Quality linking to reward	
	CL7	Usage of communication tool	
Planning and target setting	PTS1	Allocate of resources	
	PTS2	Long term plan	
	PTS3	Elimination of poor quality programme	
	PTS4	Competitor comparison measurement	
	PTS5	Uses market survey	
	PTS6	Evaluation of quality performance	
	PTS7	Identifies customer preferences	
Strategic feedback and learning	SFL1	Review achievement on quality	
	SFL2	Report on quality problem	
	SFL3	Feedback on quality improvement	
	SFL4	Process measure and information on quality	
	SFL5	Employee accordance to plan	

Communication and linking

By communicating and linking LSS strategy throughout the organization, it should practise the top bottom alignment, employee empowerment and employee reward to achieve strategy objectives and performance (Kaplan & Norton 1996a). As commonly reported in the quality and performance literatures, organizational member should be rewarded based on their performance (Goold & Quinn, 1990). This includes praise, promotions, and financial incentives (Kaplan and Norton, 2006). After achieving a clear understanding among the organization members on the organizational strategy and goal, the reward system of SCS needs to be implemented on order to attain organizational strategic objectives (Kaplan & Norton, 1996a).

Planning and target setting

Another important element of SCS which is planning and target setting, involves the strategic planning process, strategic objective, strategy formulation, and development of action plan needed for achievement of organizational strategy (Flamholtz et al., 1985; Govindarajan & Gupta, 1985; Goold & Quinn, 1993; Ittner & Larker,1995; Kaplan & Norton (1996b). According to Kaplan and Norton (1999b; 2006) the important target setting to organization is to assist and guide the smooth resources allocation and measure short term and long term financial and nonfinancial performance. They also argue that management system needs to align planning and target setting to the organization strategy in order to achieve high business result.

Strategic feedback and learning

In the globalization and high competitive environment, feedback and learning from multiple perspectives are a timely aid in implementation of organization strategy (Kaplan & Norton, 1996a). Strategic feedback and learning are important to identifying the strategic information regarding market and performance review, sharing vision and knowledge, and feedback for helping the organization to build and create long-term growth and improvement.

Methodology

In this study, one of the objectives was to investigate the instrument of SCS. A survey is considered as the most economical among methods available for data collection due to its ability in performing efficient data collection (Moser & Kalton, 1971). In general, a survey typed questionnaire approach is relatively low cost of memory, time saving, and simple approach. Moreover, by using survey methods, it can clarify the question the survey respondents and recording their responses to be used as data for analysis (Chang, 2002). Therefore it had been used by the authors. During the data collection period between August 2010 and November 2010, as many as 400 questionnaire were distributed to top management in Malaysian automotive suppliers and 252 completed from received giving the response rate of 63%.

Result and Discussion

Structural Equation Model (SEM) is method of data analysis which is increasingly used in operation management empirical studies (Shah & Goldstein 2006). Exploratory Factor Analysis (EFA) with varimax rotation was performed on the SCS constructs. EFA with varimax rotation by 24 items from SCS was done on random sample (n = 252) of Malaysian automotive companies to produce basic details of each SCS namely: Clarifying and Translating Strategy (CTS), Communication and Linking (CL), Planning and Target Setting (PTS), and Strategic Feedback and Learning (SFL). Kaiser-Meyer-Olkin (KMO) sampling adequacy measure was 0.955 which was greater than 0.7, signifying that the current data was suitable for principal component analysis. Similarly, the Bartlett's test of sphericity was significant ($p < 0.001$), indicating that correlation was adequate among the items to proceed for analysis as described in Table 4.

At a minimum, 0.4 loading of each item on its respective factor are considered adequate for that factor. The EFA of 24 items of SCS construct have yielded in four factors explaining 61.27% of the total variance as shown in Table 5. The last column (cumulative percentage) signified that variance was described by factors taken prior rotation. The cumulative variability explained by the four factors in extracted solution was also 61.27% similar to the initial solution. Therefore, no change explained by the initial solution was lost because of hidden factors that reflected the method suitability of the method in getting the SCS constructs.

Table 4: KMO and Bartlett's Test for SCS constructs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.955

Barlett's Test of Sphericity	Approx. Chi-Square	3223.678
	Df	276
	Sig.	.000

Table 5: Results of total variance explained for SCS efforts

Com	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var	Cum %	Total	% of Var	Cum %	Total	% of Var	Cum %
1	10.800	45.000	45.000	10.800	45.000	45.000	4.016	16.735	16.735
2	1.761	7.339	52.339	1.761	7.339	52.339	3.849	16.037	32.772
3	1.143	4.761	57.100	1.143	4.761	57.100	3.495	14.564	42.336
4	1.001	4.171	61.271	1.001	4.171	61.271	3.345	13.936	61.271

*Note: Com=Component, Var=Variance, Cum=Cumulative

Relating to the building of SCS, 24 items were fit in four factors as recommended. A varimax rotation was also done. The CTS, PTS, and SFL item was incorporated into the expected structuring as originally designed. The load factor was higher than 0.4 to the factors of its own. However, the second factor consisted of six items from CL as CL1. Cl3, CL4, CL5, CL6, and CL7. An item from the original question was suggested for exclusion from analysis was CL12. From the EFA results, constructing SCS was identified with four factors. The first represented clarifying and translating (CTS), the second factor embodied communication and linking (CL), the third factor stood for planning and target setting (PTS), and the fourth factor was for strategic feedback and learning (SFL).

The Cronbach's alpha measure of reliability of SCS construct was between 0.935 and 0.954. Nunnally (1978) allowed a slightly lower minimum limit such as 0.6 for exploratory work involving the use of newly developed scales. Since, Cronbach's alpha value for each factor above 0.70, all factor are accepted as being reliable for the research. Table 6 shows the result of EFA and reliability analysis.

Table 6: EFA and Reliability analysis of the 6S, CTS, SFL and FP

Factor	**Number of items**	**First Eigen value**	**Percentage of variance explained**	**Cronbach Alpha**
SCS		10.800	61.27	
Clarifying and translating the strategy (CTS)	5	0.955	CTS3	0.961
Communication and Linking (CL)	6	0.952	CL7	0.954
Planning and target setting (PTS)	7	0.934	PTS1	0.935
Strategy feedback and learning (SFL)	5	0.949	None	0.949

By referring to Table 6, elimination of 'question CTS3', will increase (α) to the value of 0.955 to 0.96, elimination of question CL7', will increase α to the value of 0.952 to 0.954, and elimination of 'question PTS1', will increase α to the value of 0.934 to 0.949 for SCS construct. Due to the fact that all construct has the reliability α value greater than 0.7, thus it shows that all items from statistic construct is reliable and should not be dropped for further analysis.

Confirmatory Factor Analysis (CFA)

The next analysis involves testing the measurement model of SCS construct on singe factor and multiple factor.

CPA – single factor

In this stage, refer to table $\chi 2$/df ratio having range from 1.036 to 1.983 that is less than 3.0. Joreskog and Sorbom (1993) suggested that it should be between 0 and 3 with smaller values indicating better fit. Regarding the factor loading, the standardized coefficient estimate is between 0.42 (PTS6) and 0.66 (CTS4). All these are considered good which is above the acceptable level of 0.3 (see figure 2). The goodness fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and Tucker-Lewis coefficient (TLI) more than 0.9. Values are more than 0.8 indicate marginal fit (Handley and Benton, 2009), whereas value more than 0.9 presenting good fit (Hu and Bentler, 1998, 1999). Next, the root mean square error of approximation (RMSEA) also shows a good value less than 0.08. Browne and Cudeck (1993) proposed that values less than 0.08 indicates good fit, and value high than 0.08 represent reasonable error of approximation in the population. Hence, the test outcome suggests that this four construct can be used for SCS.

Table 7: CFA: Single factor for SCS construct

Factor	χ 2	df	χ 2/df	P-value	GFI	AGFI	CFI	TLI	RMSEA
CTS	9.917	5	1.983	.078	.985	.956	.991	.981	.063
CL	16.103	9	1.789	.065	.951	.951	.988	.980	.056
PTS	14.498	14	1.036	.413	.983	.966	.999	.999	.012
SFL	6.015	5	1.203	.305	.991	.972	.998	.996	.028

Note: χ2= Chi-Square, df= Degree of freedom

CFA for SCS constructs – multiple factor

This stage, SCS construct are tested its validity using the maximum likelihood method with multiple factor. The diagram was presented in Table 8 and Figure 2. CFA result showed a good fit. χ 2 statistic was 320.855 (degree of freedom = 224, p <0,001), with χ 2/df ratio of 1.432, a value that is less than 3.0 proved an excellent fit. The Goodness of Fit (GFI) was 0.901 and Adjusted Good of Fit (AGFI) was 0.878. The Comparative Fit Index (CFI) was 0.967, Tucker Lewis coefficient (TLI) was 0.962. This score was close to 1.0 indicating an almost perfect fit. The next statistic set focusing on the root mean square error of approximation (RMSEA) was 0.042 which was less than 0.08, symbolized a good fit. Canonical correlations, rc (0.84, 0.78, 0.62, 0.85, 0.68 and 0.62) giving the values at less than 1.0, evidence show that discriminant validity was acceptable.

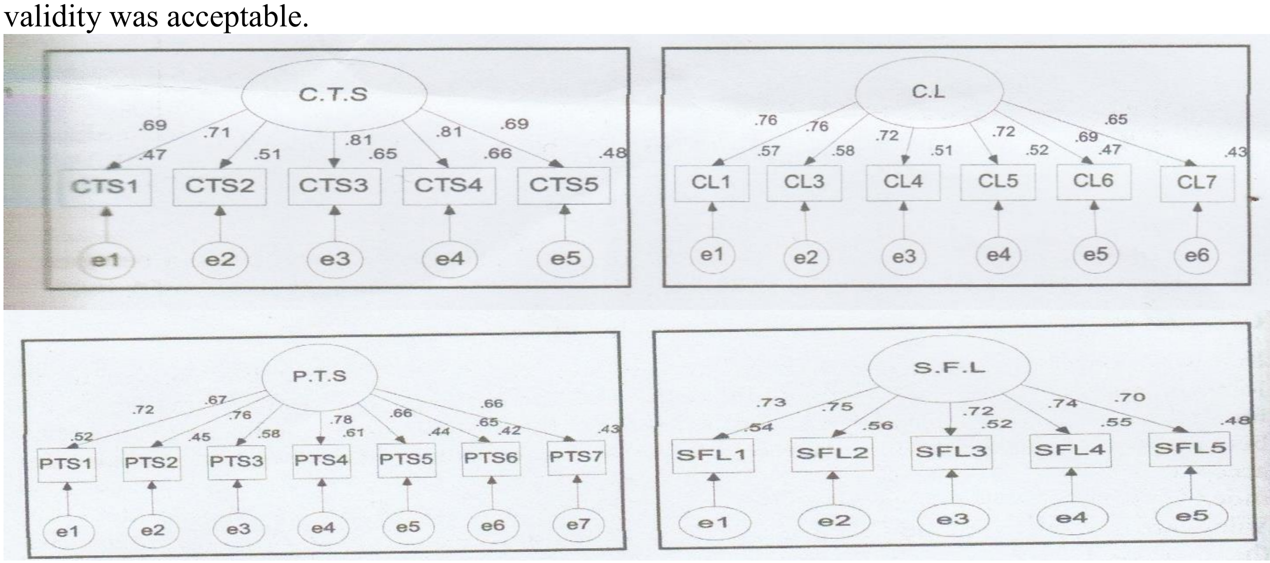

Figure 2: CFA single factor for SCS constructs

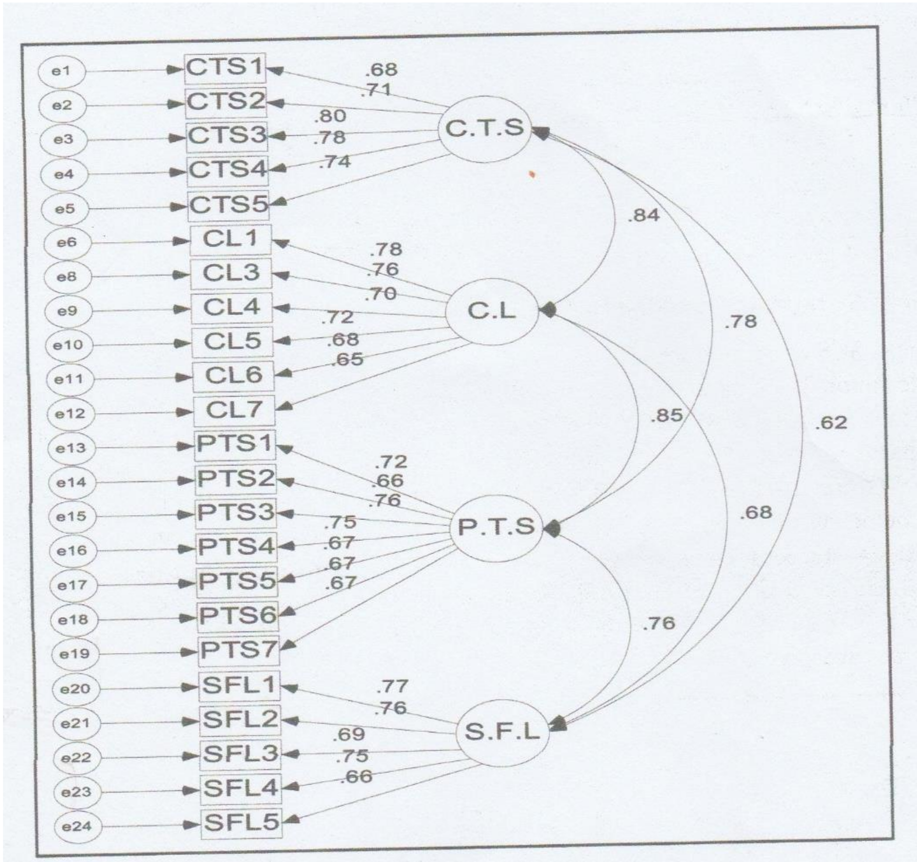

Figure 3: The output path diagram for four factors SCS model

With regards to factor loading, the standardized coefficient, the recorded value between 0.654 (CL7) and 0.803 (CTS3) was good because it transcended the acceptable value of 0.3 with p-value <0,001 as shown in Figure 3 and Table 9. Thus, it confirms that four factors are able to measure SCS.

Table 8: CFA: multiple factor for 6S

Factor	χ 2	df	χ 2/df	p-value	GFI	AGFI	CFI	TLI	RMSEA
SCS	87.601	53	1.653	. 002	.949	.924	.984	979	.051

Note: χ 2= Chi-Square, df= Degree of freedom

Table 9: Regression weights of four SCS construct

	Unstandardized Estimate	p-value	Standardized Estimate
CTS5 <...... C.T.S	1.000	***	.736
CTS4 <...... C.T.S	1.039	***	.784
CTS3 <...... C.T.S	1.052	***	.803
CTS2 <...... C.T.S	.871	***	.709
CTS1 <...... C.T.S	.811	***	.677
CL7 <...... C.L	.969	***	.654
CL6 <...... C.L	1.008	***	.677
CL5 <...... C.L	1.000	***	.719
CL4 <...... C.L	1.026	***	.702
CL3 <...... C.L	1.110	***	.760
CL1 <...... C.L	1.074	***	.778
PTS7 <...... P.T.S	1.073	***	.674
PTS6 <...... P.T.S	1.046	***	.669
PTS5 <...... P.T.S	1.000	***	.674
PTS4 <...... P.T.S	1.200	***	.748
PTS3 <...... P.T.S	1.235	***	.763
PTS2 <...... P.T.S	1.063	***	.659
PTS1 <...... P.T.S	1.164	***	.723
SFL5 <...... S.F.L	1.080	***	.659
SFL4 <...... S.F.L	1.182	***	.749
SFL3 <...... S.F.L	1.000	***	.692
SFL2 <...... S.F.L	1.159	***	.755
SFL1 <...... S.F.L	1.267	***	.769

Conclusion and Future Research

Strategy control system are become most importance strategy and it involves local car manufacturers and automotive suppliers in their effort to become more effective and competitive in their pursuit to enhancing the organization's ability to improve quality, business operation, customer and employee satisfaction and business performance. The original model SCS by literature are proved and valid. The results of four factors showed that the measurement model for SCS constructs had a good fit and the model valid and reliable for Malaysian automotive industry. In conclusion, it can be described that SCS is a latent exogenous variable, which is represent by four observed endogenous variable namely, the next step and agenda for future research, the authors propose to study the structural relationship between lean six sigma, SCS and organizational performance using SEM in Malaysian automotive industry

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