STRATEGIC BALANCED SCORECARD SYSTEMS FOR MALAYSIAN AUTOMOTIVE INDUSTRY

Nurul Fadly Habidin[1], Baharudin Omar[1], Syed Ismail Syed Mohamad[1], Mad Ithnin Salleh[1], Nurdiana Ibrahim[2]
[1]Faculty of Management & Economics, Universiti Pendidikan Sultan Idris (UPSI), Tanjong Malim, Perak, Malaysia.
[2]Entrepreneurial Development Centre, Universiti Pendidikan Sultan Idris (UPSI), Tanjong Malim, Perak, Malaysia.

Abstract

The implementation of Strategic Control Systems (SCS) 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 aligns with organizational goal. Thus, the aim of this study is to develop models that incorporate SCS implementation and organizational performance (OP) in Malaysia automotive industries. A survey through questionnaire was conducted to determine the SCS as well as OP measurement. Structural equation modeling technique was adopted to analyze the data gathered from the survey. Exploratory factor analysis, reliability analysis and confirmatory factor analysis for testing the construct validity, test for reliability and model measurement were carried out. From the findings of the survey, it was shown that SCS assist in improving OP and practitioners to constantly improve OP through the implementation of SCS.

Keywords *Strategic control systems, organizational performance, balanced scorecard, strategic performance measures, automotive*

INTRODUCTION

Today, the development and the number of quality initiative programs have increased over the years. But of late, many organizations have decided to move from the existing quality initiatives to the Balanced Scorecard (BSC) initiative as a business system to improve the smoothness of business operations and organizational performance. For example, BSC strategy will have effect on the organizational performance measures in Malaysian Automotive industry (Habidin and Yusof, 2011). Automotive industry itself is moving forward toward preparing lower cost of production, cheaper price, JIT deliveries, and elimination of waste and defects in many aspects of the activity or operation, and strengthening relationships with vendors, and ultimately producing high quality products and customers services better than competitors.

Nonetheless, after more than 27 years of Malaysian automotive industry establishment, the performance of the national car maker and the supplied parts by local suppliers still receive criticism, complaints, and various suggested approaches to improve their product quality, operation management, and customer satisfaction.. In the meantime, in the effort to improve the quality of the automotive industry, the Malaysian government has always been an assistance and support to various agendas of development in quality initiative, strategies and policies such as preparing automotive vendor development program, zero defects, partnership strategy, and the National Automotive Policy (NAP).

Over the years, various strategic performance programs have been implemented in manufacturing companies and it has been recognized as an essential requirement for organizations in helping to facilitate business operations processes and thus enhance organizational performance. However, many organizations fail to achieve desired performance results when implementing the quality initiatives improvement (Kristof, 2005). There are two main reasons as to why organizations fail to achieve desired performance results. Firstly, the measurement of organizational performance measurement is not comprehensive and it is not designed based on the quality initiatives programs and organizations working environment (Dixon et al., 1990). Next, the quality initiative and the SCS are not integrated in achieving organizational performance improvement (Daniel and Reitsperger, 1991; Ittner and Larcker, 1997; Moura E and Sa Kanji, 2003; Andersen et al., 2004; Hoque, 2004). These problems are caused by the lack of comprehensive knowledge and understanding of the company leaders and managers in identifying and making strategic decisions to opt the best initiatives that match the quality of the company objectives, market requirements, strategic management and culture and work environment. As a result, they affect the course of business operations and overall company performance. Eventually, the implementation of integrating various quality initiatives cannot be successfully implemented as an effective strategic business system.

Through the implementation of various quality initiatives integration, it should not only to create a multifactor, comprehensive set, balanced approach, and strategically align, but more towards linking all of these business systems in strategically and systematically manner. This works as a backup and strength to the organization, especially to the automotive industry which is the backbone of the national economy in facing global competition and dynamic competition. Therefore, the quality of this initiative should be integrated and interdependently linking all aspects of human, technical, process and result so that it becomes an effective and systematic strategic business system.

Based on literature support and gap of this study, the aim of this paper is to develop a structured relationship model between the SCS and OP measures, for which the expected results of this study will benefit the automotive industry to be more strategically focus on operational excellence to continually seek better improvement from the perspective of customer satisfaction, process management, cost reduction, and innovative learning and growth performance.

LITERATURE REVIEW

Kaplan and Norton (1992) proposed multiple performance measurements using balanced scorecard approach. These comprehensive measures of performance are based on four perspectives: financial, customer, business process/operation, and innovation/learning growth. The four perspectives are composed to chain of cause and effect relationship. Kanji (2002) proposed Kanji business scorecard to assist organization to implement a strategy for business excellence. He also suggested four key areas for measuring organizational performance, namely: maximize stakeholder value, achieve process excellence, improve organizational learning and delight the customer. These four key areas are also consistent with the four perspective of BSC as documented by Kaplan and Norton (1996a).

According to Jusoh et al., (2008) investigated the impact of performance measurement measures toward performance improvement in Malaysian manufacturing firm. In this study, they identified 29 performance measure items taken from Hoque et al., (2001) which was also originally adopted from Kaplan and Norton (1992) and developed nine items which were self constructed from literature. Their research findings, found that firm performance is positively affected from the overall measure of BSC usage. They also argued that when firms applied performance measures alone it was not sufficient to measure performance. However, the quantity for valid data of this study is considered small and not comprehensive enough for the view on the level of understanding of the BSC concept and implementation in manufacturing firm.

In addition, Othman (2007) explored the adaptation of BSC in Malaysian organizations. He found that the reason for BSC adoption is because it is a part of a process to improve performance, implement a major change in strategy, and help to manage a corporate turnaround process, to rationalize operation, integrate the operation of the organization, overcome past weaknesses in strategy implementation process, and ensure continuity of existing techniques.

BSC is viewed in different perspectives 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). However Kaplan and Norton (1992) argued that BSC is not only about performance measurement, but it also aligns organizations with strategic management which directly translates an organization's strategies into action oriented plans. In addition to that, Kaplan and Norton (1996a,1996b) developed strategic management system.

SCS will have effect on the organizational performance such as monitoring the implementation of long-term strategy, coordination and alignment between planning, communication, and organization goal, improving strategic planning such as control and feedback, improving alignment of strategic objectives with actions, focusing resources on strategy, developing a consistent system of objectives in the organization, and improving understanding of cause-and-effect relationship in the organization (Goold and Quinn, 1990; Kaplan and Norton, 1992; and Speckbacher et al., 2003). According to their empirical study, Fullerton and McWatters (2002) evaluated the relationship between the JIT practices and control system represented by performance measure and incentive system in US manufacturing firm. The result found that non financial measures and incentive system are related to the degree of JIT practices implemented. Specifically, firm must adapt their control system by bottom-up measures, product quality, and vendor quality, employee empowerment and compensation reward to improve organizational performance.

Strategic Control Systems Constructs

Based on extensive review of the literature, this study has found different elements of SCS that have been proposed by various researchers. The SCS framework by Kaplan and Norton (1996a) is selected for this study as the SCS framework of this study since it includes clarifying and translating vision and strategy, communicating and linking, planning and target setting and strategic feedback and learning; all important for strategic control purposes. Four strategic control systems in 24 measurement items was refer from Kaplan and Norton, 1996a; Ittner and Larcker, 1997; Ya'acob (2008).

Organizational Performance Measures

In order to have successful implement quality initiative, the construct should impacts on some performance measures. Performance measurement is common in any firm. Based on that, according to Ittner and Larcker (1998), managers need to focus on both financial and non-financial measures to achieve organizational goals. The balance comes from tracking not only financial performance measure such as operating income, sales growth and sales revenue, but also non-financial ones as well. This is because non-financial measures are likely to facilitate organizational decisions and actions that support strategies based on the stakeholders need (Hoque and James, 2000). It has also been suggested (Kaplan and Norton, 1996a, 2001) that non financial performance measure helps managers to assess changes in the business environments, determine and evaluate progress towards the firm's goal, and affirm achievement of business performance. The proposed organizational performance consists of the four performance measures in 33 measurement items based on literature by Kaplan and Norton, 1996a; Hoque et al., 2001; Mahapatra and Mohanty, 2007; Jusoh and Parnell, 2008; Bhasin, 2008; and Eker and Pala, 2008.

METHODOLOGY

Automotive industries were chosen because the use of quality initiative and performance measurement in this sector is very important (Zakuan et al., 2009). It is an important industrial driver of industrial management and development, because it brings together various components, which are manufactured by suppliers in other industries (Chin and

Saman, 2004). Having said that, the sample should be a subset of the total population, which has the characteristics of the population. In this study, samples were selected from the list of Proton and Perodua automotive suppliers.

In achieving the objectives of the study, the Malaysian automotive suppliers firms were selected as the population and the data was obtained from Proton Vendor Association (PVA) and Kelab Vendor Perodua (KVP). These lists of automotive suppliers consist of electrical, electronic, metal, plastic, rubber, and other automotive part. Finally, as many as 400 questionnaire were distributed to top management in Malaysian automotive suppliers and 257 completed from received giving the response rate of 64.3%.

In this study, one of the objectives was to investigate the instrument of SCS constructs and OP measures. Exploratory Factor Analysis (EFA) with varimax rotation was performed on the SCS constructs and OP measures. 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. The result indicates that four factor of SCS constructs have been identified with 23 items are compared to original questionnaires which are 24 items. Next, the EFA of 33 items of OP were explaining 70.58% of the total variance. The result indicates that four OP measure have been identified 28 items are compared to original questionnaires which are 33 items.

According to Rasli (2006) reliability analysis is done on all items at once, while the rest opined that it is better to carry out analysis after items have been factored. In this research, the latter method was adopted and internal consistency was conducted on 23 items of SCS and 28 item of OP by using SPSS reliability analysis procedure. The Cronbach's Alpha measure of reliability of SCS construct and OP measures was between 0.955 and 0.934. 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 1 shows the result of EFA and reliability analysis.

Table 1 EFA and Reliability analysis of the SCS constructs and OP measures

Factor	Number of items	First Eigen value	Percentage of variance explained	Cronbach Alpha
Strategic Control System		10.800	61.27	
CTS	5			.955
CL	6			.952
PTS	7			.934
SFL	5			.949
Organizational Performance				.891
FP	7	18.959	70.58	.952
CP	7			.936
IBP	7			.948
ILG	7			.940

Confirmatory Factor Analysis – Single Factor

This section will discuss the results of factor analysis for single factor authentication. This analysis was divided into two parts: SCS constructs and OP measures. The purpose is to validate all factors or items to have convergent validity.

CFA – Single Factor for SCS

Refer to Table 2, the $\chi 2$/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 0.56 and 0.86. All these are considered good which is above the acceptable level of 0.3. 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 Bneton, 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 good fit with value less than 0.08. Browne and Cudeck (1993) proposed that values less than 0.08 indicates good fit, and values high than 0.08 represent reasonable errors of approximation in the population.

In this stage, SCS construct was tested by using maximum likelihood method with multiple factor. Table 2 reveals the CFA outcome result indicating an excellent fit, with $\chi 2$/df value less than 2.0 showing a good fit. The GFI, AGFI, CFI and TLI were greater than 0.9 proving a very good fit and value of RMSEA less than 0.08. Based on the factor loading, the standardized coefficient estimates between 0.653 and 0.810 are above 0.3 with a p-value < 0.001. The R-square value for each indicator is between 0.42 (PTS6) and 0.66 (CTS4), and the constructs are shown in Figure 1. Hence, the test outcome suggests that this four construct can be used for SCS.

Table 2 CFA: Single factor for SCS construct

Factor	$\chi 2$	df	$\chi 2$/df	p-value	GFI	AGFI	CFI	TLI	RMSEA
SCS									
CTS	9.917	5	1.983	.078	.985	.956	.991	.981	.063
CL	16.103	9	1.789	.065	.979	.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: $\chi 2$= Chi-Square, df= Degree of freedom

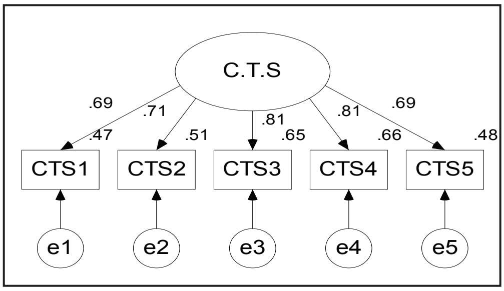

Figure 1 CTS - results and factor loading

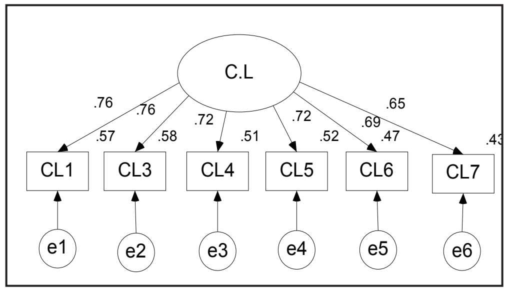

Figure 2 CL - results and factor loading

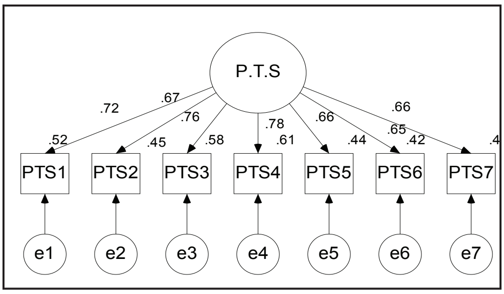

Figure 3 PTS - results and factor loading

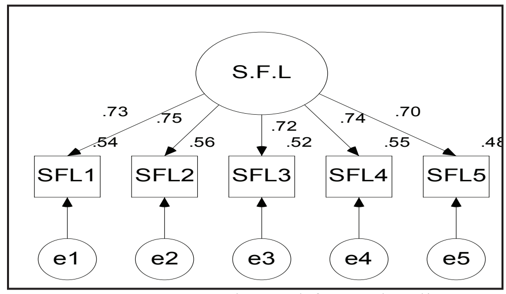

Figure 4 SFL - results and factor loading

Figure 1 CFA single factor for SCS constructs

CFA – Single Factor for Organizational Performance (OP) Measure

The next level involves CFA for organizational performance (OP). The results of the CFA show that χ2/df value less than 2.0 showing a good fit. The GFI, AGFI, CFI and TLI were greater than 0.9 proving a very good fit (see Table 3). RMSEA was less than 0.08 resembling good fit. On the factor loading, the standardized coefficient estimates between 0.72 and 0.89 are good which is above the the acceptable level, 0.3 with p-value < 0.001. The highest change percentage, R-square value was 0.79 (CP6) and the lowest change percentage was 0.51 (ILG1) as presented in Figure 2.

Table 3 CFA: Single factor for OP measure

Factor	χ2	Df	χ2/df	p-value	GFI	AGFI	CFI	TLI	RMSEA
OP									
FP	18.100	14	1.293	.202	.980	.959	.997	.995	.034
CP	20.722	14	1.480	.109	.977	.953	.995	.993	.044
IBP	15.520	14	1.109	.344	.983	.966	.999	.998	.021
ILG	17.710	14	1.265	.220	.981	.962	.997	.996	.032

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

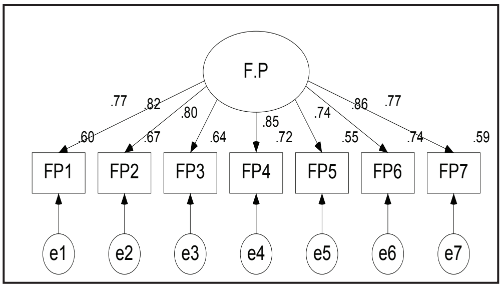

Figure 1 FP - results and factor loading

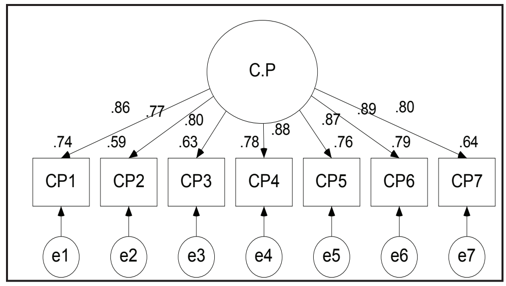

Figure 2 CP - results and factor loading

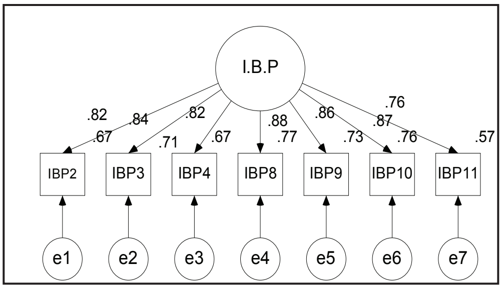

Figure 3 IBP - results and factor loading

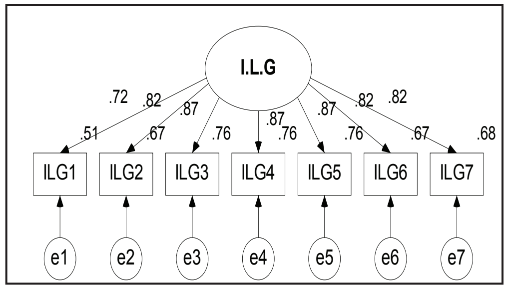

Figure 4 ILG - results and factor

Figure 2 CFA single factors for OP measure

First Order Confirmatory – Multiple Factors

The next analysis is called the First Order Confirmatory with Multiple Factors. It is also known as measurement model test, whereby SCS construct and organizational performance (OP) measures are tested using the first order confirmatory model and confirmed for evaluating construct validity by using the maximum likelihood method with multiple factors.

SCS construct with four factors

The third level of confirmation, the first order of confirmatory factor with multiple factors was tested and exhibited that SCS effort was the four construct structure consisted of clarifying and translating (CTS), communication and linking (CL), planning and target setting (PTS), and strategic feedback and learning (SFL).

The diagram was presented in Figure 3. CFA result showed a good fit. $\chi 2$ statistics was 320.855 (degree of freedom = 224, $p < 0.001$), with $\chi 2$/df ratio of 1.432, a value that was 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 Index (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 0.76) giving the values at less than 1.0, showed that discriminant validity was acceptable.

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. Thus, it confirms that four factors are able to measure SCS.

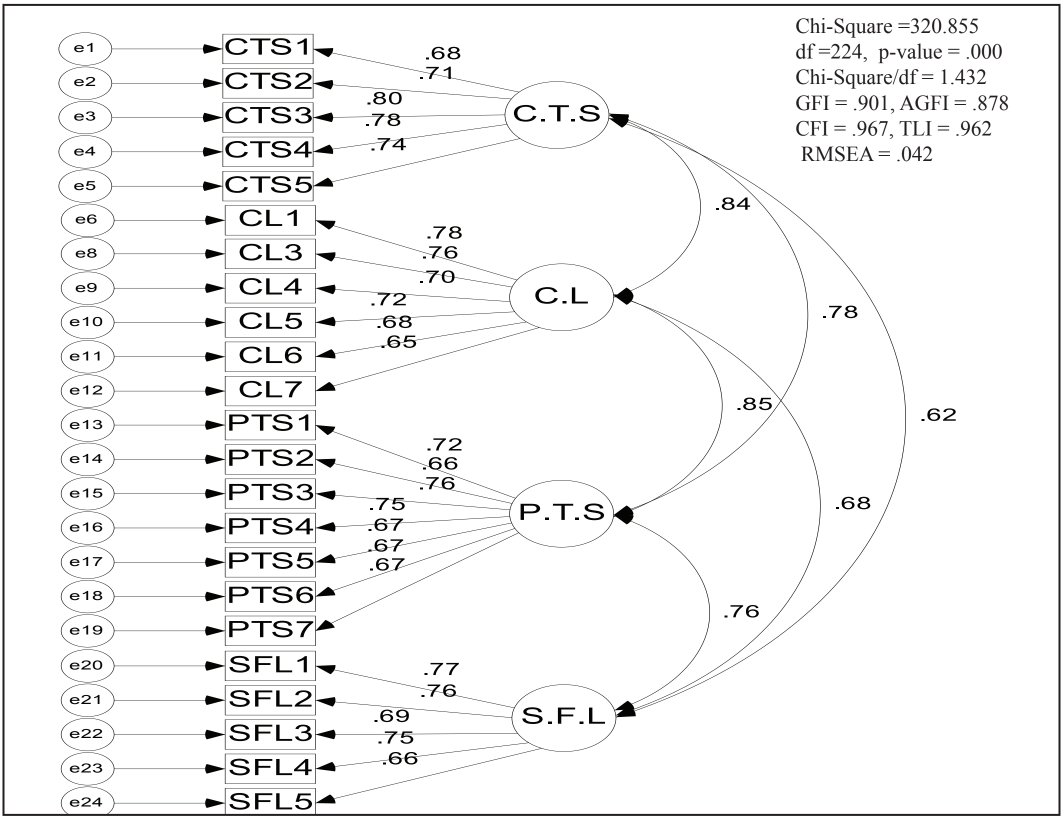

Figure 3 The output path diagram for three factors SCS model

Organizational performance (OP) measures with four factors

The second confirmation level with First Order Confirmatory with Multiple Factors tested was OP with four steps comprised of FP, CP, IBP, and ILG. The diagram is presented in Figure 4. The CFA result demonstrated a good fit. Statistics of $\chi2$ was 576.684 (degree of freedom = 344, $p < 0.001$), with ratio of $\chi2/df$ was 1.676 which was less than 3.0 exhibiting a good fit. The Goodness of Fit (GFI) was 0.862 and Adjusted Good Fit (AGFI) was 0.837. The Comparative Fit Index (CFI) was 0.963, Tucker Lewis coefficient (TLI) was 0.960. The score was very close to 1.0 signifying perfect fit. Root mean square error of approximation (RMSEA) was 0.052 and less than 0.08 and reflected good fit. Canonical correlation (rc) indicated a value of less 1.0, implying that discriminant validity was acceptable.

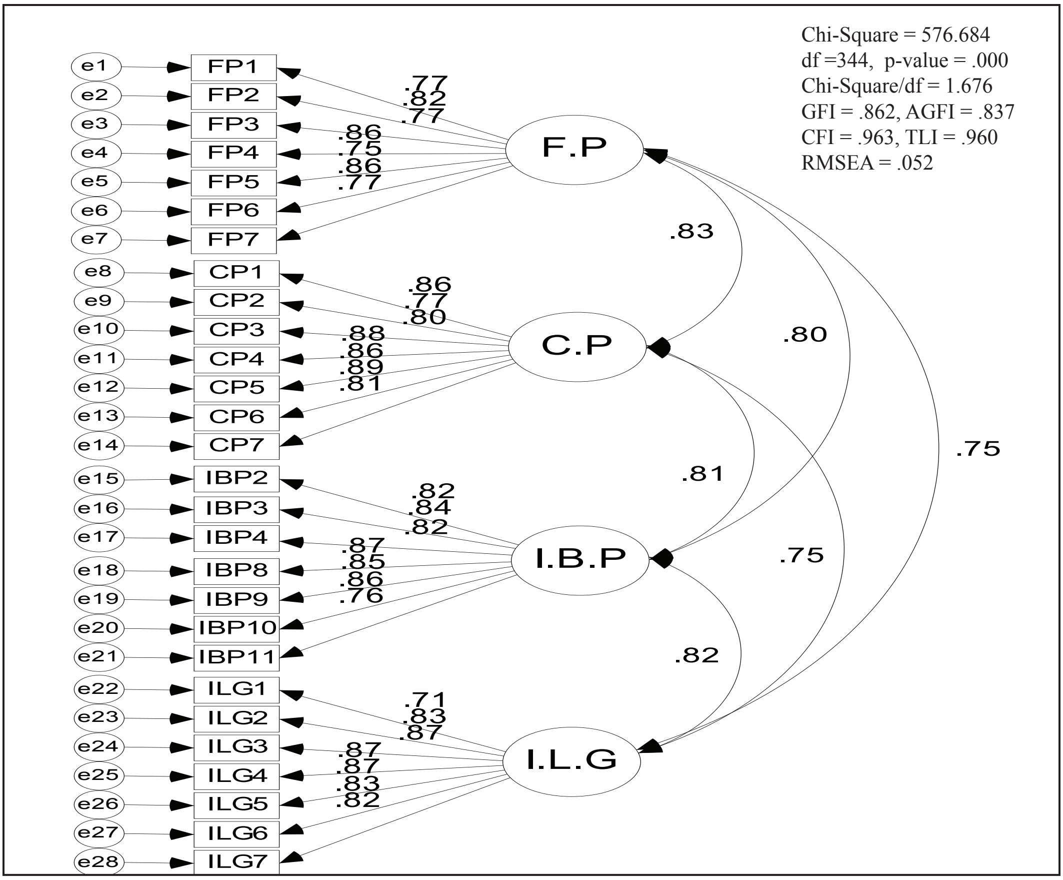

Figure 4 The output path diagram for four factors OP model

Regarding the factor loading, the standardized coefficient was between 0.712 (ILG1) and 0.886 (CP6) which was beyond the acceptable limit of 0.3 with p value < 0.001. Therefore, it confirms the ability of the four factors to measure the organizational performance (OP).

RESULT AND DISCUSSION

These theoretical discussion and proposed hypothesized relationships are delineated in the following research model, as shown in Fig. 5 and leads to the following hypotheses:

H_1: There is a positive and direct significant relationship between strategy control system and organizational performance of Malaysian automotive industry.

The final analysis is to look at any mediating effect of SCS. Figure 4.5 indicates the weight of both internal and external regression for structural relationship between SCS and

OP, based on structural model for Malaysian automotive industry (n = 252). The goodness-of-fit indices for structural model ($\chi2$/df = 2.181, GFI = 0.969, AGFI = 0.926, CFI = 0.988, TLI = 0.977 and RMSEA = 0.069) was good within the general acceptable limit, exhibited a good fit data. The standardized regression weight and p-value for structural relationship is illustrated in Table 4.

The result demonstrated that the standardized regression weight for H^1 was 0.662 and significant at p <0.005. This result is supported to H_1 in which SCS implementation has a direct and strong relationship on OP of Malaysian automotive industry.

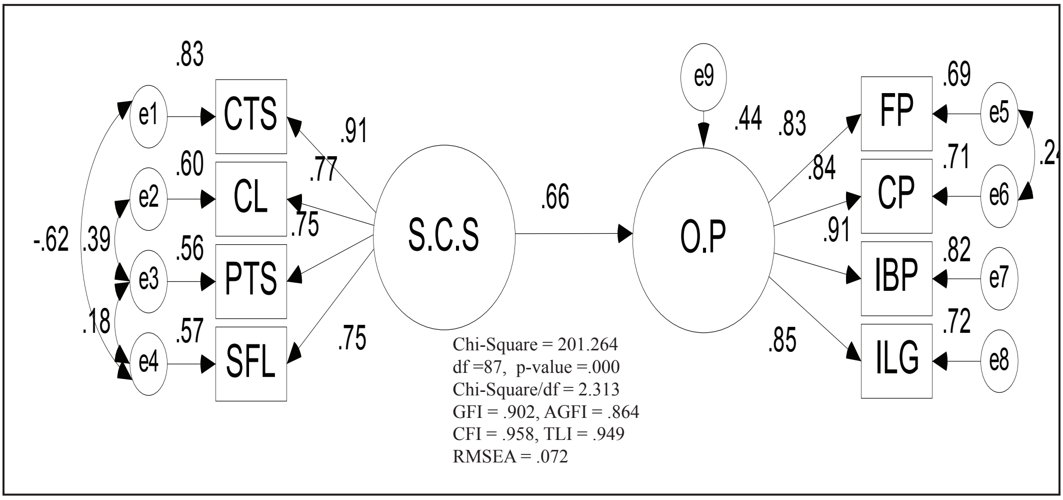

Figure 5 Inner and outer regression weights for the structure relationship between SCS and OP for Malaysia automotive industry

Table 4 shows that structural relationship between SCS and OP for Malaysian automotive industry was found to be positive and significant, which confirmed that SCS implementation gave strong positive direct impact towards OP. This decision conforms to the previous empirical research (Ya'acob, 2008). It was not surprising that SCS give strong and direct impact on organization performance. This may be one of the causes of why automotive industry in Malaysia is are interested and aware about the role of SCS.

Table 4 Standardized regression weight between latent variables in the structural model

Hypotheses	Structural relationship	Standardized regression weight	p-value	Results
H_1	SCS → OP	0.66		Supported

CONCLUSION

This paper presents the research outcome and related analysis. It starts with research detailed presentation of EFA analysis, reliability and CFA analysis. Test of reliability and validity are among the different factors presented and instrument used in this research are found to be valid and reliable.

Next, by taking into account the structural analysis, this study has used the Structural Equation Modeling (SEM) to investigate the effect the relationship between SCS and OP. The association and relationship between these factors are generally positive and significant. This proves that SCS plays important role to improve OP Malaysian automotive industry.

In determining the SCS variables, this study uses only four SCS variables by Kaplan and Norton (1996a,b) as a strategic factor in supporting the LSS to enhance OP. However, in this the era of globalisation, some improvements could be made in line with environmental and quality program initiatives in practice. Accordingly, it is suggested that future studies improve and increase the SCS through the combination of variables between quantitative and qualitative case study to obtain much better elements relevant for current scenario in the automotive industry.

Finally, it hoped that this research would be of benefit to automobile manufacturer and automotive supplier in their effort to become much more efficient and competitive, to enhance the organization ability in improving operation, customer and employee satisfaction, technology and innovation development, and business performance.

ACKNOWLEDGEMENT

The authors wish to thank RMC, UPSI, and The Fundamental Research Grant Scheme (FRGS) for their financial support and facilities for conducting this research project.

REFERENCES

Andersen, H. V., Lawrie, G., and Savic, N. (2004). Effective quality management through third generation balanced scorecard. *International Journal of Productivity and Performance Management*, 53(7), 634–645.

Bhasin, S. (2008). Lean and performance measurement. *Journal of Manufacturing Technology Management*, 19(5), 670–684.

Browne, M. W., and Cudeck, R. (1993). Testing Structural equation model. In Bollen, K. A, and Long, J. S (Eds.). Alternative Ways of Assessing Model Fit, Newbury Park: Sage, CA, 136–162.

Daniel, S. J., and Reitsperger, W. D. (1991). Linking quality strategy with management control system: Empirical evidence from Japanese industry. *Accounting, Organizations and Society*, 16 (7), 601–618.

Dixon, J. R., Nanni, A. J., and Vollmann, T. E. (1990). *The New Performance Challenges – Measuring Operating for World-Class Competition*. Dow Jones Irwin, Homewood, USA.

Eker, M., and Pala, F. (2008). The effect of competition, just in time and total quality management on the use of multiple performance measures: an empirical study. *Journal of Economic and Social Research*, 10(1), 35–72.

Fullerton, R. R., and McWatters, C. S. (2002). The role of performance measures and incentive systems in relation to the degree of JIT implementation. *Accounting, Organizations and Society*, 27, 711–735.

Goold, M., and Quinn, J. J. (1990). The paradox of strategic controls. Strategic Management Journal, 11(1), 43–57.

Habidin, N. F. and Yusof, S. M. (2011). Structural analysis of lean production and financial performance in Malaysian automotive suppliers: the mediating role of strategy feedback and learning. *Management Research Journal*, 1(1), 101–115.

Handley, S. M., and Benton Jr., W. C. (2009). Unlocking the business outsourcing process model. *Journal of Operation Management*, 27 (5), 344–361.

Hoque, Z. (2004). A contingency model of the association between strategy environment uncertainty and performance measurement: impact on organization performance. *International Business Review*, 13, 485–502.

Hoque, Z., and James, W. (2000). Linking the balanced scorecard measures to size and market factors: impact on organizational performance. *Journal of Management Accounting Research*, 12, 1–17.

Hoque, Z., Mia, L., and Alam, M. (2001). Market competition, computer-aided manufacturing and use of multiple performance measure: An empirical study, *British Accounting Review*, 33, 23–45.

Hu, L., Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to under parameterized model misspecification. *Psychological Method*, 3 (4), 424–254.

Hu, L., Bentler, P. M. (1999). Cutoff criteria for fit indixes in convariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, 6 (1), 1–55.

Ittner, C. D., and Larcker, D. F. (1997). Quality strategy, strategic control systems and organizational performance. *Accounting, Organizations and Society*, 22 (3/4), 295–314.

Ittner, C. D., and Larcker, D. F. (1998). Innovations in performance measurement: trends and research implications. *Journal of Management Accounting Research*, 10, 205–238.

Joreskog, K. G., and Sorbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software International.

Jusoh, R., and Parnell, J. A. (2008). Competitive strategy and Performance measurement in the Malaysia context: an exploratory study. *Management Decision*, 46(1), 5–31.

Jusoh, R., Ibrahim, D. N., and Zainuddin, Y. (2008). The performance consequence of multiple performance usage: evidence from the Malaysian manufacturers. *International Journal of Productivity and Performance Management*, 57(2), 119–136.

Kanji, G. K. (2002). *Measuring business excellence*. Routledge Advances in Management and Business Studies. London, Routledge.

Kaplan, R. S., and Norton, D. P. (1992). The balanced scorecard-measure that drive performance. *Harvard Business Review*, January-February, 71–79.

Kaplan, R. S., and Norton, D. P. (1996a). *The balanced scorecard-translating strategy into action*, Boston: Harvard Business Scholl Press.

Kaplan, R. S., and Norton, D. P. (1996b). Using the balanced scorecard as a strategic management system. *Harvard Business Review*, January-February, 71(1), 75–85.

Kaplan, R. S., and Norton, D. P. (2001). *The strategy-focused organization: how balanced scorecard companies thrive in the new business environment*. Boston: Harvard Business School Press.

Kristof, G. M. (2005). *Planning Business Improvement using Analytic Hierarchy Process (AHP) and Design Structure Matrix (DSM)*. Master of Science Thesis. Industrial and Management Engineering, Montana State University, Bozeman, Montana.

Mahapatra, S. S., and Mohanty, S. R. (2007). Lean manufacturing in continuous process industrial research. *Journal of Scientific and Industrial Research*, 66, January, 19–27.

Moura, E. S. P., and Kanji, G. K. (2003). Finding the path to organizational excellence in Portugese local government: A performance measurement approach. *Total Quality Management*, 14(4), 491–505.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw Hill.

Othman, R. (2007). Effects and effectiveness of the balanced scorecard: Malaysian evidence. *Malaysian Management Review*, 42(1), 1–15.

Rasli, A. (2006). *Data analysis and interpretation: A handbook for postgraduate social sciences*. Penerbit Universiti Teknologi Malaysia, Johor, Malaysia

Rooriquez, A. B. (2008). *A framework to align strategy, improvement performance, and customer satisfaction using an integration of six sigma and balanced scorecard*, Dissertation of Doctor Philosophy, Department, of Industrial Engineering and Management System, College of Engineering and Computer Science, University of Central Florida, Orlando, Florida.

Sidiropoulos, M., Mouzakitis., Adamides, E., and Goutsos, S. (2004). Applying sustainable indicator to corporate strategy: the eco-balanced scorecard. *Environmental Research, Engineering and Management*, 1 (27), 28–33.

Speckbacher, G., Bischof, J., and Pfeiffer, T. (2003). A descriptive analysis on the implementation of Balanced Scorecard in German-speaking countries. *Management Accounting Review*, 14(4), 361–387.

Ya'acob, Z. (2008). *A Structural relationship between total quality management, strategic control systems and performance of Malaysian local governments*. PhD Theses, Faculty of Accountancy, Universiti Utara Malaysia, Malaysia.