

PERPUSTAKAAN UMP



THE APPLICAE  
SYSTEM FOR

0000117827

ANCE MEASUREMENT  
RISES IN MALAYSIA

NOR FILIANIE BINTI AZIZ

Thesis submitted in fulfillment of the requirements  
for the award of the degree of  
Master of Technology Management (Operation Management)

Faculty of Industrial Technology Management

UNIVERSITI MALAYSIA PAHANG

NOVEMBER 2016

|  |                         |
|--|-------------------------|
| PERPUSTAKAAN 04054<br>UNIVERSITI MALAYSIA PAHANG G |                         |
| No. Perolehan<br><b>117827</b>                     | No. Panggilan<br>FIM    |
| Tarikh<br><b>17 APR 2017</b>                       | F55<br>2016<br>r Thesis |

## **TABLE OF CONTENT**

|  |        |
|--|--------|
| <b>DECLARATION</b>                                 |        |
| <b>TITLE PAGE</b>                                  |        |
| <b>ACKNOWLEDGEMENTS</b>                            | ii     |
| <b>ABSTRAK</b>                                     | iii    |
| <b>ABSTRACT</b>                                    | iv     |
| <b>TABLE OF CONTENT</b>                            | v      |
| <b>LIST OF TABLES</b>                              | ix     |
| <b>LIST OF FIGURES</b>                             | x      |
| <b>LIST OF ABBREVIATIONS</b>                       | xi     |
| <br><b>CHAPTER 1 INTRODUCTION</b>                  | <br>1  |
| <br>1.1 Introduction                               | <br>1  |
| 1.2 Background of Study                            | 1      |
| 1.3 Problem Statement                              | 2      |
| 1.4 Research Question                              | 5      |
| 1.5 Research Objective                             | 5      |
| 1.6 Research Scope                                 | 6      |
| 1.7 Significance of Study                          | 6      |
| 1.8 Organisation of Study                          | 7      |
| 1.9 Research Motivation                            | 8      |
| 1.10 Operational Definition                        | 9      |
| <br><b>CHAPTER 2 LITERATURE REVIEW</b>             | <br>11 |
| 2.1 Introduction                                   | 11     |
| 2.2 Small and Medium Enterprises                   | 11     |
| 2.2.1 Malaysian SMEs Scenario and Background       | 13     |
| 2.2.2 SMEs Evolution                               | 15     |
| 2.3 Performance Measurement                        | 16     |
| 2.3.1 Definition of Performance Measurement System | 16     |

|        |  |           |
|--------|--|-----------|
| 2.3.2  | Overview of Performance Measurement System                     | 17        |
| 2.4    | Performance Measurement System Model                           | 18        |
| 2.4.1  | Theory of Constraints  | 19        |
| 2.4.2  | Performance Measurement Matrix                                 | 21        |
| 2.4.3  | Result and Determinant Framework                               | 22        |
| 2.4.4  | European Foundation for Quality Management Business Excellence | 23        |
| 2.4.5  | SMART Performance Pyramid                                      | 25        |
| 2.4.6  | Balanced Scorecard   | 26        |
| 2.4.7  | Integrated Performance Measurement System for Small Firms      | 29        |
| 2.4.8  | Integrated Performance Measurement System                      | 29        |
| 2.4.9  | Integrated Dynamic Performance Measurement System              | 30        |
| 2.4.10 | Kanji Business Excellence Model                                | 32        |
| 2.4.11 | Performance Prism  | 33        |
| 2.4.12 | Organizational Performance Measurement                         | 34        |
| 2.4.13 | Medori and Steeple Framework                                   | 35        |
| 2.4.14 | Dynamic Multidimensional Performance Framework                 | 37        |
| 2.4.15 | Holistic Performance Management Framework                      | 39        |
| 2.5    | Performance Measurement System in Small and Medium Enterprises | 40        |
| 2.6    | Criteria of Performance Measurement System                     | 42        |
| 2.7    | Summary  | 43        |
|        | <b>CHAPTER 3 METHODOLOGY</b>                                   | <b>45</b> |
| 3.1    | Introduction   | 45        |
| 3.2    | Research Procedure   | 45        |
| 3.3    | Data Collection Technique                                      | 48        |
| 3.4    | Experts Panel  | 49        |
| 3.4.1  | Respondent Population  | 50        |
| 3.4.2  | Sample Size of Respondents                                     | 51        |
| 3.4.3  | Criteria of Respondent   | 52        |
| 3.5    | Pilot Study/ Pre- Data Collection                              | 53        |
| 3.6    | Data Analysis Method   | 53        |
| 3.6.1  | Analytic Hierarchy Process                                     | 54        |

|   |  |            |
|---|--|------------|
| 3.7   | Reliability and Validity               | 60         |
| 3.8   | Summary                                | 61         |
| <b>CHAPTER 4 RESULT AND FINDINGS</b>            |  | <b>62</b>  |
| 4.1   | Introduction                           | 62         |
| 4.2   | Respondent Demography                  | 62         |
| 4.3   | Hierarchical Structure                 | 63         |
| 4.4   | Analysis of Analytic Hierarchy Process | 65         |
| 4.4.1   | Group Decision Making                  | 66         |
| 4.4.2   | Pair-wise Comparison Matrices          | 66         |
| 4.4.3   | Normalized Matrix                      | 77         |
| 4.4.4   | Priority Vector                        | 86         |
| 4.4.5   | Overall Priority Vector                | 98         |
| 4.5   | Consistency analysis                   | 100        |
| 4.6   | Summary                                | 101        |
| <b>CHAPTER 5 CONCLUSION AND RECOMMENDATIONS</b> |  | <b>103</b> |
| 5.1   | Introduction                           | 103        |
| 5.2   | Discussion                             | 103        |
| 5.3   | Limitation                             | 107        |
| 5.4   | Conclusion                             | 107        |
| 5.5   | Recommendation                         | 108        |
| <b>REFERENCES</b>                               |  | <b>111</b> |
| <b>APPENDIX A</b>                               |  | <b>126</b> |
| <b>APPENDIX B</b>                               |  | <b>127</b> |
| <b>APPENDIX C</b>                               |  | <b>154</b> |
| <b>APPENDIX D</b>                               |  | <b>155</b> |

## LIST OF TABLES

|            |  |    |
|------------|--|----|
| Table 2.1  | SME Definition in Terms of Annual Sales Turnover and SME<br>Definition in Terms of Full- Time Employees      | 11 |
| Table 2.2  | SMEs Definition by Size of Operation   | 12 |
| Table 2.3  | The Previous Definition and Effective 1 <sup>st</sup> January 2014 of<br>Malaysian New SMEs Definition       | 13 |
| Table 2.4  | Percentages of Distributions of SMEs by Sector   | 14 |
| Table 2.5  | Performance Measurement System Model   | 18 |
| Table 2.6  | Perspective of Performance Measurement Matrix  | 21 |
| Table 2.7  | Dimension of the Results and Determinants Model  | 22 |
| Table 2.8  | The Six Stage of Plan Outline  | 36 |
| Table 2.9  | The potential Baseline Measures based on Five Dimensions   | 38 |
| Table 3.1  | Schedule of Questionnaire Handed Out   | 49 |
| Table 3.2  | Evaluation Scales of Pairwise Comparison   | 56 |
| Table 3.3  | AHP Reference Conceptually of Criteria for Selecting Alternative   | 57 |
| Table 3.4  | The Random Consistency Index   | 60 |
| Table 4.1  | Respondent Demographic   | 63 |
| Table 4.2  | Conceptually of Criteria for Selecting Alternative   | 64 |
| Table 4.3  | Preference Scale Rating of AHP Questionnaire   | 66 |
| Table 4.4  | Pair-wise Comparison Matrices of Criteria versus Criteria  | 67 |
| Table 4.5  | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Strategy derived)                       | 68 |
| Table 4.6  | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Alignment operation of strategy vision) | 69 |
| Table 4.7  | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Construct purpose/ objective clearly)   | 69 |
| Table 4.8  | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Stimulate continuous improvement)       | 70 |
| Table 4.9  | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Relevant and easier maintainable)       | 71 |
| Table 4.10 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Provide accurate and faster feedback)   | 72 |

|            |  |    |
|------------|--|----|
| Table 4.11 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Balanced Multi- dimensional)      | 72 |
| Table 4.12 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>Managerial past performance)       | 73 |
| Table 4.13 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Planning future performance)      | 74 |
| Table 4.14 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Stakeholder consideration)        | 74 |
| Table 4.15 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Promote integration)              | 75 |
| Table 4.16 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Determinate formulae and source)  | 76 |
| Table 4.17 | Pair- wise Comparison Matrices of Alternative versus Alternative<br>(Easier to understand and develop) | 77 |
| Table 4.18 | Normalized Matrix of Criterion versus Criteria   | 78 |
| Table 4.19 | Normalized Matrix of Alternative versus Alternative for<br>(Strategy derived)                          | 78 |
| Table 4.20 | Normalized Matrix of Alternative versus Alternative for<br>(Alignment operation of strategy vision)    | 79 |
| Table 4.21 | Normalized Matrix of Alternative versus Alternative for<br>(Construct purpose/ objective clearly)      | 79 |
| Table 4.22 | Normalized Matrix of Alternative versus Alternative for<br>(Stimulate continuous improvement)          | 80 |
| Table 4.23 | Normalized Matrix of Alternative versus Alternative for<br>(Relevant and easier maintainable)          | 81 |
| Table 4.24 | Normalized Matrix of Alternative versus Alternative for<br>(Provide accurate and faster feedback)      | 81 |
| Table 4.25 | Normalized Matrix of Alternative versus Alternative for<br>(Balanced / multi-dimensional)              | 82 |
| Table 4.26 | Normalized Matrix of Alternative versus Alternative for<br>(Managerial past performance)               | 83 |
| Table 4.27 | Normalized Matrix of Alternative versus Alternative for<br>(Planning future performance)               | 83 |

|            |   |     |
|------------|---|-----|
| Table 4.28 | Normalized Matrix of Alternative versus Alternative for<br>(Stakeholder consideration)        | 84  |
| Table 4.29 | Normalized Matrix of Alternative versus Alternative for<br>(Promote integration)              | 85  |
| Table 4.30 | Normalized Matrix of Alternative versus Alternative for<br>(Determinate formulae and source)  | 85  |
| Table 4.31 | Normalized Matrix of Alternative versus Alternative for<br>(Easier to understand and develop) | 86  |
| Table 4.32 | Priority Vector of Criteria   | 87  |
| Table 4.33 | Priority Vector of Alternatives (Strategy Derived)  | 88  |
| Table 4.34 | Priority Vector of Alternative (Alignment Operation of Strategy<br>Vision)                    | 89  |
| Table 4.35 | Priority Vector of Alternative (Construct Purpose/ Objective<br>Clearly)                      | 89  |
| Table 4.36 | Priority Vector of Alternative (Stimulate Continuous<br>Improvement)                          | 90  |
| Table 4.37 | Priority Vector of Alternative (Relevant and Easier Maintainable)                             | 91  |
| Table 4.38 | Priority Vector of Alternative (Provide Accurate and Faster<br>Feedback)                      | 92  |
| Table 4.39 | Priority Vector of Alternative (Balanced/ Multi-dimensional)                                  | 93  |
| Table 4.40 | Priority Vector of Alternative (Managerial Past Performance)                                  | 93  |
| Table 4.41 | Priority Vector of Alternative (Planning Future Performance)                                  | 94  |
| Table 4.42 | Priority Vector of Alternative (Stakeholder Consideration)                                    | 95  |
| Table 4.43 | Priority Vector of Alternative (Promote Integration)  | 96  |
| Table 4.44 | Priority Vector of Alternative (Determinate Formulae and Source)                              | 97  |
| Table 4.45 | Priority Vector of Alternative (Easier to Understand and Develop)                             | 97  |
| Table 4.46 | Analysis of Overall Priorities Vector   | 99  |
| Table 4.47 | Consistency Analysis Alternative versus Alternative based on<br>Criteria's                    | 101 |

## **LIST OF FIGURES**

|            |   |     |
|------------|---|-----|
| Figure 3.1 | Research Procedure  | 48  |
| Figure 3.2 | Example Contribution of Structure Hierarchy for AHP                                 | 55  |
| Figure 4.1 | The Hierarchical Structure of Performance Measurement System<br>for Malaysian SME's | 64  |
| Figure 4.2 | The Graph of Overall Priority Vector  | 100 |

## LIST OF ABBREVIATIONS

|        |   |
|--------|---|
| PMS    | Performance Measurement System                            |
| SMEs   | Small and Medium Enterprises                              |
| MPC    | Malaysia Productivity Corporation                         |
| MCDM   | Multi-Criteria Decision Making                            |
| MADM   | Multi Attribute Decision Method                           |
| MODM   | Multi Objective Decision Method                           |
| AHP    | Analytic Hierarchy Process                                |
| SD     | Strategy Derived  |
| AOSV   | Alignment Operation of Strategy Vision                    |
| CPOC   | Construct Purpose/ Objective Clearly                      |
| SCI    | Stimulate Continuous Improvement                          |
| REM    | Relevant and Easier Maintainable                          |
| PAFF   | Provide Accurate and Faster Feedback                      |
| DM-D   | Balanced (Multi-Dimensional)                              |
| MPF    | Managerial Past Performance                               |
| PFP    | Planning Future Performance                               |
| SC     | Stakeholder Consideration                                 |
| PI     | Promote Integration                                       |
| DFS    | Determinate Formulae and Source                           |
| EUD    | Easier to Understand and Develop                          |
| TOC    | Theory of Constraints                                     |
| PMM    | Performance Measurement Matrix                            |
| RDF    | Result and Determinant Framework                          |
| EFQM   | European Foundation for Quality Management                |
| SPMM   | SMART Performance Pyramid                                 |
| BSC    | Balanced Scorecard  |
| IPMSSF | Integrated Performance Measurement System for Small Firms |
| IPMS   | Integrated Performance Measurement System                 |
| IDPMS  | Integrated Dynamic Performance Measurement System         |
| KBEM   | Kanji's Business Excellence Model                         |
| PP     | Performance Prism   |
| OPM    | Organizational Performance Measurement                    |
| MSF    | Medori & Steeple's Framework                              |
| DMPF   | Dynamic Multi-Dimensional Performance Framework           |

|      |  |
|------|--|
| HPMF | Holistic Performance Measurement Framework |
| MBEF | Malaysian Business Excellence Framework    |
| GDP  | Gross Domestic Product                     |

PERPUSTAKAAN UMP



THE APPLICAE  
SYSTEM FOR

0000117827

ANCE MEASUREMENT  
RISES IN MALAYSIA

NOR FILIANIE BINTI AZIZ

Thesis submitted in fulfillment of the requirements  
for the award of the degree of  
Master of Technology Management (Operation Management)

Faculty of Industrial Technology Management

UNIVERSITI MALAYSIA PAHANG

NOVEMBER 2016

|  |                         |
|--|-------------------------|
| PERPUSTAKAAN 04054<br>UNIVERSITI MALAYSIA PAHANG G |                         |
| No. Perolehan<br><b>117827</b>                     | No. Panggilan<br>FIM    |
| Tarikh   | F55<br>2016<br>r Thesis |
| <b>17 APR 2017</b>                                 |                         |

## **ABSTRAK**

Pengukuran Pengurusan Prestasi (PPP) dilihat sebagai faktor kejayaan dan kegagalan syarikat; terutama di dalam perniagaan kecil dan sederhana (PKS) dibandingkan dengan perniagaan besar. PPP sebagai sistem penting untuk membangunkan dan mengekal orientasi perniagaan. Peranan PPP dalam PKS adalah berterusan dan bertindakbalas untuk mencapai matlamat. Walau bagaimanapun pengurusan PKS tidak semudah yang dijangkakan; dan PKS boleh gagal dan bankrap dengan mudah. Sementara itu PKS mempunyai potensi untuk meramal kegagalan dan digunakan sebagai panduan untuk mengembangkan syarikat dalam sector PKS. Batasan kedua-dua PKS dan PPP mendorong penyelidik menjalankan kajian ini; dengan tiga objektif kajian telah dibina. Objektifnya adalah untuk menganalisis PPP paling sesuai untuk PKS Malaysia berdasarkan kesesuaian. Oleh itu, kajian ini dijalani untuk mengenalpasti PPP utama yang sedia ada dan untuk menentukan kriteria yang paling berkenaan dengan PPP untuk PKS. Dalam kaedah ini, pengkaji telah menggunakan reka bentuk penyelidikan kuantitatif. Manakala reka bentuk kuantitatif telah dibangunkan dengan menggunakan “Analytic Hierarchy Process (AHP)” sebagai kaedah analisis. Seperti yang dinyatakan, pakar panel telah dipilih daripada pengamal dan ahli akademik dikaitkan dengan PPP dan SME di Malaysia. Hasil dan dapatan menunjukkan Balanced Scorecard (BSC) sebagai kedudukan pertama PPP dalam PKS. Model PPP yang berkaitan dan sesuai telah menunjukkan kepentingan masa depan untuk pembangunan PKS di Malaysia. Pada akhir kajian, penyelidik membuat perbincangan dan kesimpulan; ia juga berkongsi had dan cadangan untuk memperbaiki dan melaksanakan model sesuai yang terbaik dalam PKS di Malaysia, kemudian kepada ahli akademik pada masa depan.

## **ABSTRACT**

The Performance Measurement Systems (PMSs) seen as part of a factor that indicates the successful and un-successful company; especially in the Small and Medium Enterprises (SME's) compared with a large company. PMS is an important tool to develop and maintain the company orientation. The roles of PMSs in the SME's business are continuously and responsiveness to achieve the goals. However SMEs management is not as easy as expected and SMEs can fail and bankrupt easily. Meanwhile, PMSs have the potential to predict failure and used as a guide for the survival of companies in the SME sector. The limitations both of SMEs and PMSs makes researcher interested to conduct this study; with three research objectives was developed. The main objective is to determine most preferred PMSs for Malaysian SMEs based on applicability; thus the study was carried out to identify main existing PMSs and to determine the most applicable criteria of PMSs for SMEs. In the methodology, the researcher was used quantitative research design. Whereas quantitative design had been applied with the Analytic Hierarchy Process (AHP) as method analysis. As pointed, experts panel were selected from practitioners and academicians linked with PMSs and SME's in Malaysia. The result and findings show the Balanced Scorecard (BSC) as first ranked of PMS in SMEs. The relevant and suitable PMS model has been future significance guide for Malaysian SMEs development. At the end of the study, the researcher makes the discussion and conclusion; it is also shared the limitation and recommendation to improve and implement the great suitable model in the Malaysian SME's then to academics in future.

## REFERENCES

- Abouzeedan. A, and Busler, M. 2006. Information Technology (IT) and Small –Sized Enterprises (SMEs) Management. The concept of ‘Firm Impact Sphere’, *Global Business Review*, 7: 243
- Acaps. 2012. Qualitative and Quantitative Research Techniques for Humanitarian Needs Assessment: An Introductory Brief. 1-14.
- Ahmad, N. A. and Seet, P. S. 2009. Dissecting Behaviour Associated with Business Failure: A Qualitative Study of SME Owners in Malaysia and Australia. *Asian Social Science*, Vol.5, No. 9.
- Alam, M. N; Jebran, J. K; and Hossain, M. A. 2012. Analytical Hierarchy Process (AHP) Approach on consumer’s preferences for selecting telecom operators in Bagladesh. *Information and Knowledge Management*, Vol 2, No.4, p. 7-19.
- Amir, A. M., Auzair, S. MD., and Ismail, Z. 2014. Integrated Performance Measurement System in Small and Medium Enterprises: The Role of Leadership and Decision Making Style. *Asian Journal of Accounting and Governance* 5, 47-56.
- Andersen, H., Cobbald, L., and Lawrie, G. 2001. Balanced Scorecard implementation in SMEs: reflection in literature and practice. 2GC Conference Paper, 1-12.
- Andersen, B. and Aarseth, B. H. W. 2006. Holistic performance management: an integrated framework. *International Journal of Productivity and Performance Management*, 55(1), 61 – 78.
- Ansah, R. H., Sorooshian, S. and Mustafa, S. 2015. Analytic Hierarchy Process Decision Making Algorithm. *Global Journal of Pure and Applied Mathematics ISSN 0973 1768*, Volume 11, Number 4 (2015), Pp. 2403-2410.
- Bakri, M. M. 2015. *Performance Measurement System in Malaysian Small and Medium Enterprises (SMEs)*.Malaysia Productivity Corporation. Interview: 15 May.

- Bauml, M. 2014. The impact of strategic performance management on SME performance. Dissertation no. 4326.
- Bashirudin, M. 2015. *Performance Measurement System in Malaysian Small and Medium Enterprises (SMEs)*. SMEs Corporation, Pahang. Interview: 13 May.
- Bayo-Moriones, A., Javier, M. D. d. C., and Sergio, A. E. d. L. 2011. The impact of ISO 9000 and EFQM on the use of flexible work practice. *International Journal Production Economics*, 130, 33-42.
- Boerrigter, S. 2015. The use of the sustainability balanced scorecard framework for Dutch SMEs as a tool for measuring the performance of their sustainability strategy. 5<sup>th</sup> IBA Bachelor Thesis Conference, July 2<sup>nd</sup> 2015.
- Bourne, M., Neely, A., Mills, J., and Plantts, K. 2013. Implementing performance measurement systems: A literature review. *International Journal Business Performance Management*, vol. 5, No. 1, pp. 1-24.
- Cabala, P. 2010. Using the Analytic Hierarchy Process in evaluating decision alternatives. *Operations Research and Decision*. No.1, 5-23.
- Cassel, A., Windig, J., Nylin, S., and Wiklind, C. 2001. Effects of Population Size and Food stress on fitness- Related characters in the source health, a rare butterfly in Western Europe. *Conservation Biology*, Vol. 15, No. 6, December 2001, pp. 1667-1673.
- Caterino, N., Iervolino, I., Manfredi, G., and Cosenzo, E. 2008. A comparative analysis of decision making methods for the seismic retrofit of RC buildings. *The 14<sup>th</sup> World Conference on Earthquake Engineering*, 1-8.
- Cengic, M and Fazlic, D. 2008. Balanced scorecard vs. Performance prism, 12<sup>th</sup> International Research/ Expert Conference “Trends in the Development of Machinery and Associated Technology”, 1-4
- Chavan, M. 2009. The balanced scorecard: A new challenge. *Journal of Management Development*, Vol. 28, No. 5, 2009, pp. 393-406.

- Chearskul, P. 2010. An empirical investigation of performance measurement system use and organizational performance. *Dissertation Submitted to The Faculty of The Virginia Polytechnic Institute and State University in Partial Fulfillment of The Requirement for The Degree of Doctor of Philosophy in Industrial and Systems Engineering.*
- Chen, C. K., Songsithipornchai, S., & Jang, J. Y. 2012. Does Kanji's Business Excellence Model work well? A study from the measurement aspect. *Proceedings of the Asia Pacific Industrial Engineering & Management Systems Conference* 2012, 991-1002.
- Chennell, A. F., Dransfield, S. B., Field, J. B., Fisher, N. I., Saunders, I. W., and Shaw, D. E. 2000. OPM: A system for organisational performance measurement. *Presented at "Performance Measurement- Past, Present, and Future", University of Cambridge*, 19-21.
- Chmelikova, G. 2013. Performance Factors of Czech Brewing Industry Companies. *ACTA Universitatis Agruculture Et Silviculture Mendelianae Brunensis*, Vol. LXI, No. 2, 353-366.
- Cocca, P. and Alberti, M. 2009. A framework to assess performance measurement systems in SMEs. *International Journal of Productivity and Performance Management* Vol. 59 No. 2, 2010 pp. 186-200
- Dato' Sri Mohd Najib, T. A. R. 2015. Ucapan Bajet Tahun 2016, Rang Undang- undang Perbekalan 2016.
- David, Medori, Derek, Steeple. 2000. A framework for auditing and enhancing performance measurement systems. *International Journal of Operations & Production Management*, 20(5), 520 – 533.
- Dilantai, M. G. S. 2015. Review on the suitability of conceptual performance measurement systems for lean manufacturing. *International Journal of Scientific Engineering and Technology*. Vol. 4, Issue 10, Pp. 498-501.

- Dixon, J. R, Nanni, A. J. and Vollmann, T. E. 1990. The new performance Challenge\_ Measuring Operation for World Class Competition, Dow Jones- Irwin, Homewood, IL.
- Dolalah, D., AL-Oqla, F., and Hayajneh, M. 2010. Application of the Analytic Hierarchy Process (AHP) in Multi- criteria Analysis of the selection of cranes. *Jordan Journal of Mechanical and Industrial Engineering*. Vol. 4, No. 5, 567 578.
- Drehman, M. and Nikolaou, K. 2009. Funding liquidity risk definition and measurement. *Working Paper*. Series No. 1024.
- Dusanjh, D. 2009. Small and Medium Enterprises (SME) in Malaysia- Overview and Analysis,
- Economic Census. 2011. Profile of SMEs, Section III: Special Highlights, SME Annual Report 2011/ 12 National SME Development Council.
- Elder, S. 2009. ILO school-to-work transition survey: A methodological guide. *International Labour Office*, ISBN 978-92-2-121419-9.
- Fitzgerald, L., Johnston, R., Brignall, T. J., Silvestro, R. and Voss, C. 1991. Performance Measurement in Service Businesses, CIMA, London.
- Folan, P. and Browne, J. 2005. A review of performance measurement: towards performance management. *Computers in Industry*. 56(2005) pp. 663-680.
- Frederico and Francisco, G. 2009. The measurement of organizational performance with a focus on stakeholder: A performance prism approach. 011-0471. 1-17.
- Frutuoso Braz, R. G., Scavarda, L.F., & Martins, R. A. 2011. Reviewing and improving performance measurement systems: An action research. *Int. J. Production Economics* 133(2011), 751-760.
- GAO, 1991. Using Structured Interviewing Techniques, Program Evaluation and Methodology Division, United Stated General Accounting Office. 1-105.

- Garengo, P., Biazzo, S., and Bititci, U. S. 2005. Performance measurement systems in SMEs: A review for a research agenda. *International Journal of Management Reviews*, 7(1), 25-47.
- Giannopoulos, G., Holt, A., Khansalar, E., and Cleanthous, S. 2013. The use of balanced scorecard in small companies. *International Journal of Business and Management*, Vol. 8. No. 14.
- Gibson, T. and Vaart, H. J. V. D. 2008. Defining SMEs: A less imperfect way of defining small and medium enterprises in developing countries. *Brookings Global Economy and Development*, 1-29.
- Goldratt, E. M., and Fox, R. F. 1986. The Race Croton-on-Hudson, NY: North River Press.
- Gomez, J. G., Costa, M. M., and Lorente, A. R. M. 2011. A critical evaluation of the EFQM model. *International Journal of Quality & Reliability Management*, 28(5), 484-502.
- Granlund, H. 2012. Measuring effects of strategic utilization of social media in business to- business marketing: Case Green lux Finland. *Master Thesis; Lappeenranta University of Technology*.
- Halir, Z. 2012. Different perspectives on business performance and impact on performance system design. *European Financial and Accounting Journal*, Vol. 7, No. 2, Pp. 56-81.
- Harrison, J. A., Rouse, P., and Charl, J. 2012. Accountability and performance measurement: A stakeholder perspective. *The Business and Economics Research Journal*, vol. 5, issue. 2, pp. 243-258.
- Hashim, H. 2013. Overview of SME sector in Malaysia, Malaysia- India SME Forum, Mandarin Oriental Hotel, 1-56.
- Hashim, H. 2014. Developing competitive women- owned SMEs through coordinated programmes, SME Corp. Malaysia.

- Hudson, M., Smart, A., & Bourne, M. 2001. Theory and practice in SME performance measurement systems. *International Journal of Operations & Production Management*, 21, 1067-1115.
- Ibrahim, M. 2015. *Performance Measurement System in Malaysian Small and Medium Enterprises (SMEs)*. SMEs Corporation, Terengganu. Interview: 19 May.
- Illmer, S. J. 2011. Success through excellence Illmer investment performance consulting AG. Slide 1.
- Ismail, A. W., Zarina, S., and Siti, Z. B. 2008. Budaya keusahawanan Panduan Memulakan Perniagaan. Arah Pendidikan Sdn. Bhd, Selangor. Edition 1.
- Jebna, A. K. K. and Baharudin, A. S. 2013. Factor affecting small and medium enterprises success: An exploratory study. *Jurnal Teknologi (Social Sciences)*, 69-72.
- Johansson, A. 2013. The Link between Performance Measurement and HRM Systems in SMEs- Using Swedish Case Studies in the Trade Show Industry. *Bachelor Thesis within Business Administration*.
- John, D. 2008. Integration: is it the key to effective implementation of the EFQM Excellence Model? *International Journal of Quality & Reliability Management*, 25(4), 383-399.
- Jungman, H., Okkonen, J. Rasila, T., and Seppa, M. 2004. Use of Performance in V2C activity. *Benchmarking: An International Journal*. Vol. 11: Issue. 2: Pp. 175-189.
- Kaplan, R.S. & Norton, D.P. 1992. The Balanced Scorecard-measures that drive performance. *Harvard Business Review*, January-February, 71-9.
- Kaplan, R.S. and Norton, D.P. 1996. *The Balanced Scorecard – Translating Strategy into Action*, Harvard Business School Press, Boston, MA.
- Karami, A. 2011. Utilization and comparison of multi-attribute decision making and techniques to rank Bayesian network options. *Master Degree Project in Informatics, One Year Level ECTS 30*, 1-51.

- Kekkonen, E. 2014. Designing of Balanced Performance Measurement System to Purchasing Process. Master's Thesis, Lappeenranta University of Technology.
- Kemmerer, F., and Thiagarajan, S. 1992. "Incentive System" In H. Stolovitch and E. Keeps (Eds.), *Handbook of Human Performance Technology: A Comprehensive Guide for Analyzing and Solving Performance Problems in Organizations* (pp. 312-330) San Francisco: Jossey- Bass, 1992.
- Khaliq, M., Md. Isa, A. H., Shaari, J. A. N., and Ageel, A. 2011. Challenges faced by the Small and Medium Enterprises (SMEs) in Malaysia: An intellectual capital perspective. *International Journal of Current Research*, Vol. 33, Issue, 6, pp. 398-401.
- Khan, M. W. J. and Khaliq, M. 2014. An Overview of Small and Medium Enterprises in Malaysia and Pakistan: Past, Present, and Future Scenario. *Business and Management Horizons*, Vol. 2, No. 2.
- Kim, D. Y., Vinod, K., & Steven, A. M. 2010. European foundation for quality management business excellence model. *International Journal of Quality & Reliability Management*, 27, 684-701.
- Kurien, G. P, Qureshi, M. N. 2011. Study of performance measurement practices in supply chain management. *International Journal of Business, Management and Social Sciences*, 2(4), 19-34.
- Kushnir, K., Mirmulstein, M. L., and Ramalho, R. 2010. Micro, small, and medium enterprises. Around the world: How many are there, and what affects the count? *World Bank/ IFC MSME Country Indicator*, 1-9.
- Laitinen, E. K. and Chong, G. 2006. How do Small Companies Measure Their Performance? *Problems and Perspectives in Measurement*, Vol. 4, Issue 3, 49-68.
- Langwerden, E. F. 2015. Performance Measurement System Development in SMEs: Testing & Defining the Circular Methodology. *5<sup>th</sup> IBA Bachelor Thesis Conference, Enschede, the Netherlands*.

- Lascelles, D. and Peacock, R. 1996. *Quality in Action: Self Assement for Business Excellence*, Berkshire, McGraww-Hill, UK.
- Lisiecka, K. and Czyz- Gwiazda, E. 2013. Performance Measurement Models Comparative Review. *Quality Renaissance- Co- creating Viable Future, 57<sup>th</sup> EOQ Congress*.
- Lonbani, M., Sofian, S., Bambang, M., and Barato 2014. Review of using balanced scorecard among SMEs. *International Management Accounting Conference 7*, pg. 1-10.
- Maltz A.C, Shenhari A.J and Reilly R.R. 2003. Beyond the balance scorecard: refining the search for organizational success measures. *Long Range Planning*, 36, 187-204.
- Mamman, A., Aminu, K. S., and Adah, A. 2013. Effect of Vertical Integration on Performance of Small and Medium Enterprises (SMEs) in Kaduna State, Nigeria. *International Journal of Accounting, Banking and Management* Vol. 1, No. 2, PP. 14-20.
- Martello, M., Watson, J. G., and Fischer, M. J. 2008. Implementing A Balanced Scorecard In A Not- For- Profit. *Organization Journal of Business & Economics Research*. Vol. 6, No. 9, 67-80.
- Martinez Lorento, A. R. and Martinez-Costa, M. 2004. "ISO 9000 and TQM: substitutes or complementary". *International of quality and Reliability Management*, Vol. 21, No. 3, pp. 260-276.
- Marton, M. and Paulova, I. 2010. Applying the Theory of Constraints in the course of process improvement. *Research papers, Faculty of Materials Science and Technology in Trnava, Slovak University of Technology in Bratislava*. No. 29.
- Matlay, H. and Westhead, P. 2005. virtual teams and the rise of e-entrepreneurship in Europe, *International Small Business Journal*, Vol. 23(3): 279-302.
- McLEOD, J. 2001. Qualitative Research in Counselling and Psychotherapy, London: Sage Publication.

- Metawie, M. and Gilman, M. 2005. Problem with the implementation of performance measurement systems in the public sector where performance is linked to pay: A literature review drawn from the UK. *3<sup>rd</sup> Conference on Performance Measurements and Management Control.*
- Meyer, M. W. 2002. Rethinking performance measurement: Beyond the balanced scorecard, in Cambridge University Press, pp. 81-113.
- M.Go, F., and Robert, G. 2000. Integrated quality management for tourist destination: a European perspective on achieving competitiveness. *Tourism Management*, 21, 79-88.
- Mohammad, F. A. 2012. Sizing Up Manufacturing SMEs- Definitional Implications. *Journal of Statistical Modelling and Analytics*, Vol. 3, No. 1, 37-45.
- Mohd Harif, M. A. A., Osman, H. and Chee. H. H. 2010. Financial Management Practices: An In- Depth Study among the CEOs of Small and Medium Enterprises (SME's). *International Review Business Research Papers*, Vol. 6, No. 6. Pp. 13 – 35.
- Moullin, M. 2002. Delivering Excellence in Health and Social Care. Buckingham: Open University Press.
- Moullin, M. 2003. 'Defining performance measurement', in perspectives on performance, 2(2):3
- Mu, E., Wormer, S. Barkon, B., Foizey, R., and Vehec, M. 2009. A case study of using AHP Group Decision Making for ePortfolio Selection. *Proceeding of the International Symposium on the Analytic Hierarchy Process.*
- Muhammad Jamil, C. Z., and Mohamed R. 2011. Performance measurement system (PMS) in small medium enterprise (SMES): A practical modified framework. *World Journal of Social Sciences*. 1(3).200-212.
- Najib, M. 2014. Message from YAB Prime Minister, SME Annual Report 2013/14, 2 3.

National Economic Advisory Council. 2010. New economic model for Malaysia part 1: strategic policy directions.

Naude, D. 2007. The degree of organisational performance measurement in SMEs- A focus on ICT enterprises. Research Report 7079-238-0, 1-107.

Nawi, D. M. 2015. *Performance Measurement System in Malaysian Small and Medium Enterprises (SMEs)*.Pejabat Wilayah Timur Perbadanan Usahawan Nasional Berhad. Interview: 13 May.

Neely, A., Adams, C., & Kennerley, M. 2002. The performance prism: The scorecard for measuring and managing business success. *Cranfield School of Management*, 377 pages, 1-13.

Neely, A., Gregory, M., and Plantts, Ken. 1995. Performance measurement system design; a literature review and research agenda. *International Journal of Operations and Production Management*, vol. 15, issue. 4, pp. 80-116.

Nieminen, J. 2014. Using Theory of Constraints to increase control in a complex manufacturing environment- Case CandyCo: Make-to-Stock production with a broad product offering and hundreds of components. *Department of Information and Service Economy Aalto University School of Business*.

Onwumere, J. 2000. The nature and relevance of SMEs in Economic Development. *Journal of the Institute of Bankers of Nigeria*, p. 14.

Olve. N. And Wetter, M. 1999. Performance Drivers: A Practical Guide to using Balance Scorecard, John Wiley and Sons, New York. NY.

Pavlov, A., Bourne, M. 2011. Explaining the effects of performance measurement on performance, *International Journal of Operations & Production Management*, 31(1), 101 – 122

Powell, D. and Netland, T. 2010. Towards an Integrated Performance Measurement System for Cellular Manufacturing: Insights from the Case of Volvo Aero Norway. *POMS 21<sup>st</sup> Annual Conference, Vancouver Abstract Number 015 0158*.

- Radcliffe, L. L. and Schniederjans, M. J. 2003. Trust evaluation: an AHP and multi objective programming approach. *Management Decision*, Vol.41, Iss. 6, Pp. 587-595.
- Ratte, S. 2015. SME's and Growth: Challenges and Winning Strategies. *Business Development Bank of Canada*, Pp. 1-27.
- Rompho, N. 2011. Why the Balanced Scorecard Fails in SME's: A Case Study. *International Journal of Business and Management*, Vol. 6, No.11, 39-46.
- Salem, M. A., Hasnan, N., & Osman, N.H. 2012. Balanced scorecard: Weaknesses, strengths, and its ability as performance management system versus other performance management system. *Journal of Environment and Earth Science*, Vol 2, No.9, 1-10.
- Salloum, M. 2010. Towards dynamic performance measurement systems. Master Thesis Work, Innovation and Product Realization 30HP, advanced level.
- Saaty, T. L. and Ozdemir, M. S. 2015. How many judges should there be in a group? *Ann. Data. Sci.*
- Sato, Y. 2003. Questionnaire design for survey research. Employing weighting method ISAHP 2005, Honolulu, Hawaii, July 8-10, 2003.
- Saunila, M. and Ukko, J. 2013. Facilitating innovation capability through performance measurement, a study of Finnish SMEs. *Management Research Review*, Vol. 36 No. 10, 2013, pp. 991-1010.
- Sehra, S. K., Brar, Y. S., and Kaur, N. 2012. Multi criteria decision making approach for selecting effort estimation model. *International Journal of Computer Application*, Vol.39, No.1, 1-8.
- Self, J. and Tolsor, D. 2008. Successfully implementing the balanced scorecard. Library Assessment Conference Seattle, WA.
- Simsit, Z. T., Gunay, N. S., and Vayvay. O. 2014. Theory of Constraints: A Literature Review. *Procedia- Social and Behavioural Sciences* 150 (2014) 930-936.

- Sin, K. C. 2010. The Success of Malaysian SMEs in Promoting and Penetrating Global Markets through Business Competitiveness Strategies. *Asian Research Centre, CBS, Copenhagen Papers* 2010-33
- SME annual report. 2013/14. Success Stories. 98-112
- SME annual report. 2013/14. Chapter 1: The Malaysian Economy. 7-14
- SME Corp. Malaysia. 2013. Guideline for new SME definition. Secretariat to the National SME Development Council. 1-12.
- Sorooshian, S. 2014. Study on Unbalanceness of the Balanced Scorecard, *Applied Mathematical Sciences*, Vol. 8, 2014, no.84, 4163-4169.
- Sorooshian, S. and Anvari, A. 2012. Performance Analysis: lack of Research in Asian Small and Medium Enterprise Sector, *Advances in Asian Social Science*, 1(3):312.
- Srdevic, Z. Blagojevic, B. and Srdevic, B. 2011. AHP based Group Decision Making in Ranking Loan Applicants for Purchasing Irrigation Equipment: A case study. *Bulgarian Journal of Agricultural Science*, 17 (No 4) 2011, 531-543.
- Sriwidadi, T. 2012. Integrated Performance Measurement System for SME and Management Control System.
- Stefanescu, D. and Silivestru, M. 2012. Balanced Scorecard instrument of strategic planning. *Romanian Statistical Review*. 2/ 2012, 24-39.
- Striteska, M., and Spickova, M. 2012. Review and comparison of performance measurement systems, *Journal of Organizational Management Studies*, 2012(2012), 1-12.
- Suprapto, B., Wahab, H. A., Wibowo, A. J. 2009. The implementation of balanced score card for performance measurement in small and medium enterprises: Evidence from Malaysia health care service. *The Asian Journal of Management*, Vol.2, No.2, 37-49

- Susilawati, A., Tan, J., Bell, D., and Sarwar, M. 2013. Develop a framework of performance measurement and improvement system for lean manufacturing activity. *International Journal of Lean Thinking*. Vol. 4, Issue 1.
- Taha, R. A. and Daim, T. 2013. Multi- criteria application in renewable energy analysis, a literature review. *Research and Technology Management in the Electricity Industry, Green Energy and Technology*. 17- 30.
- Tangen. S. 2004. Performance measurement: from philosophy to practice. *International Journal of Productivity and Performance Management*, 53(8), 726 – 737.
- Taticchi, P. and Balachandran, K.R. 2008. Forward performance measurement and management frameworks. *International Journal of Accounting Information Management*, 16 (2), 104-154.
- Taticchi, P., Tonelli, F., and Cagnazzo, L. 2010. Performance measurement and management: A literature review and a research agenda. *Measuring Business Excellence*, Vol. 14, No. 1 2010, pp. 4-18.
- Taticchi, P., Cagnazzo, L., and Botarelli, M. 2008. Performance Measurement and Management (PMM) for SMEs: A literature review and a reference framework for PMM design. *POMS 19<sup>th</sup> Annual Conference La Jolla, California, U. S. A*, 008-0321.
- Tewksbury, R. 2009. Qualitative versus Quantitative Methods: Understanding why qualitative methods are superior for criminology and criminal justice. *Journal of Theoretical and Philosophical Criminology*, Vol. 1 (1) 2009.
- The European Foundation for Quality Management (EFQM). 1996. Self-Assessment 1996 Guidelines, EFQM, Brussels, Belgium.
- The European Foundation for Quality Management (EFQM). 1999. The Case Study of European Communication S.S, EFQM, Brusseles, Belgium.
- The European Foundation for Quality Management (EFQM). 1999. Broucher of European Foundation for Quality Management 2001 [online], EFQM, Brusseles, Belgium.

- Thomson, S. B. 2011. Sample size and grounded theory. *JOAAG*, Vol. 5, No.1
- Ucal, I. and Oztayze, B. 2009. ANP in performance measurement and its application in a manufacturing system. *Proceeding of the International Symposium on the Analytic Hierarchy Process*, 1-8.
- Ukko, J., Tenhunen, J. and Rantanen, H. 2008. "The impacts of performance measurement on the quality of working life", *International Journal Business Performance Management*, Vol. 10 No. 1, pp. 86-98.
- Ustun, P. 2010. Application of the Theory of Constraints to an elective course registration system. *A thesis submitted to the graduate school of social sciences of Middle East technical university*, 96 pages.
- Vansteenberghe, C. 2014. The use of performance measurement system to realize strategic alignment within the business architecture. *Thesis Presented to Obtain the Degree of Master of Science in Business Economics, Faculty of Economics and Business Administration, Ghent University*.
- Volmohammadi, C. and Servati, A. 2011. Performance measurement system implementation using balanced scorecard and statistical methods. *International Journal of Productivity and Performance Management*, Vol. 60, No. 5, 2011, pp. 493-511.
- Watts, T. and McNair-Connolly, C. J. 2012. New performance measurement and management control systems. *Journal of Applied Accounting Research*, 13 (3), 226-241
- Williamsburg. 2007. The Analytic Hierarchy Process Methodologies and application with customers and management at blue cross blue shield of Florida. *The 19<sup>th</sup> International Symposium on QFD*, P. 137-149
- Wu, D. 2009. Measuring performance in small and medium enterprises in the information & communication technology industries. *A Thesis Submitted in Fulfilment of the Requirements for the Degree of Doctorate of Philosophy*, 1 209.

- Wong, J. K. W and Li, H. 2006. Application of the analytic process (AHP) in multi criteria analysis of the selection of intelligent building systems. *Science direct*, 1-18
- Wong, Kuek, and Ong. 2013. Strategic planning and business performance. A study of SMEs in Malaysia. *Proceeding of 3rd Asian Pacific business research conference* 25-26 February 2013, KL, Malaysia 1-12
- Wonggrassamee, S., Gardiner, P. D., and Simmons, J. E. L. 2003. Performance measurement tools: the Balanced Scorecard and the EFQM Excellence Model. *Measuring Business Excellence*, 7(1), 14-29.
- Yadav, N., Sushil, and Sagar, M. 2013. Performance measurement and management frameworks research trends of the last two decades. *Business Process Management Journal*, Vol. 19, No. 6, Pp. 947-970.
- Yang, J. and Lee, H. 1997. An AHP decision model for facility location selection. *Facilities*, Vol. 15, No. 9/10, Pp. 241-254.
- Yunoh, M. N. M. and Ali, K. A. M. 2015. Total quality management approach for Malaysia SMEs: Conceptual framework. *International Journal of Business and Social Science*. Vol. 6, No. 1.
- Zamani, R. and Yousefi, P. 2013. Optimal decision making approach for selecting effort estimation model. *International Journal of Machine Learning and Computing*, Vol.3, No.4, 1-
- Zeglat, D., AlRawabdeh, W., Almadi, F., and Shrafat, F. 2012. Performance Measurement Systems: Stages of Development Leading to Success. *Interdisciplinary Journal of Contemporary Research in Business*. Vol. 4, No. 7.