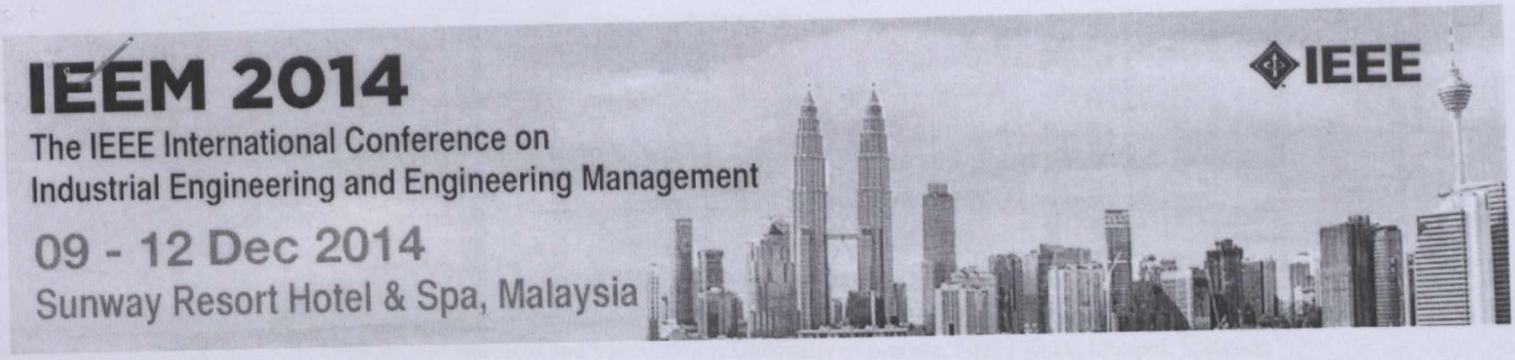

To Whom It May Concern

Proof of Attendance at IEEM2014, 09 to 12 Dec, 2014 in Malaysia
held at
Sunway Resort Hotel & Spa

Prepared for

Kanagi Kanapathy
University of Malaya

IEEM14-P-0093: Comparing Malaysian and Scottish Firms on Practices for Strategic Capability Management

Rob **DEKKERS**[1], Kanagi **KANAPATHY**[2]
[1] *University of Glasgow, United Kingdom*
[2] *University of Malaya, Malaysia*

Comparing Malaysian and Scottish Firms on Practices for Strategic Capability Management

R. Dekkers[1], K. Kanapathy[2]

[1] Adam Smith Business School, University of Glasgow, Glasgow G12 8QQ, U.K. (rob.dekkers@glasgow.ac.uk)

[2] Faculty of Business and Accountancy, University of Malaya, 50603 Kuala Lumpur, Malaysia

Abstract – **The study of practices for Strategic Capacity Management at five Malaysian companies and four Scottish companies shows that the Malaysian manufacturing managers acted more reactive due to pressures by sales and processing orders, whereas the Scottish managers were implementing a manufacturing strategy more 'independently'. Problems with suppliers, albeit sometimes caused by outsourcing, feature high on the list of challenges in both samples. Alignment of organisational structures and investment in technologies are seen by all as key to aligning the manufacturing strategy with the competitive strategy, though actual investments tend to be happening more in Scottish companies.**

Keywords – **Change model, manufacturing capabilities, manufacturing strategy, organisation, technology**

I. INTRODUCTION

The discussion about the contribution by manufacturing to competitive advantage dates back to Skinner [1]. First, arguments were based on economies of scale and, later, augmented by trade-offs for performance criteria [2][3]. Subsequently, there is recognition that interrelationship between 'individual' manufacturing capabilities might be cumulative (e.g. [4][5]). Hence, the development of adequate manufacturing capabilities that match with strategic intents constitutes a core competence for manufacturing firms.

A. Research Objectives

While there is an extensive stream of academic research on manufacturing capabilities (e.g. [6][7]), one might question how these capabilities could be achieved in relation to the manufacturing strategy. For example, Schroeder et al. [8] show that superior performance of plants is related to internal learning, external learning from customers and suppliers, and proprietary processes and equipment, and Tracey et al. [9] demonstrate the link with (advanced) manufacturing technology. Rather than treating all aspects of manufacturing capabilities in isolation, for practice all these need to be brought together, in what one could call 'strategic capability management'; however, no writing seems to exist under this term. Nonetheless, Dekkers [10] and Orr [11] introduce in their research a similar conceptual approach that covers all these aspects: Strategic Capacity Management (SCaM). That raises the question whether this notion of SCaM encompasses sufficiently the matching of manufacturing capabilities with strategic intents but also what practices companies have developed.

For the approach of matching manufacturing capabilities, this paper's research objectives are trifold. First, it investigates what should be considered part of 'strategic capability management' through a literature review and whether the concept of SCaM is sufficiently encompassing. Second, it seeks to find out how companies are practising SCaM and whether its constituent elements could serve as tools for achieving strategic intents; particularly by examining the challenges manufacturing firms face when implementing the concept. Third, Scottish companies' practices (a developed economy) will be compared with those of Malaysian companies (an emerging economy). The empirical research will contribute to understanding capability management for manufacturing and its relationship to strategy formation.

B. Scope and Outline of Paper

The first step is a literature review, including the framework for SCaM. The third section discusses the rationale for the case study methodology and the fourth section provides the results of the empirical research into manufacturing companies in Scotland and Malaysia. A discussion of findings and a concluding section complete the paper.

II. (SYSTEMATIC) LITERATURE REVIEW

As the first step in this study, it becomes necessary to define what is to be understood by 'strategic capability management' and to what extent it is covered by SCaM. With that in mind, three questions have guided the systematic literature review ([12][13]):

- Whether the concept of SCaM is the only available notion for strategic capability management in manufacturing firms.
- Whether its constituent elements: strategy, technology and organisational structures are sufficiently inclusive for strategic capability management.
- Whether its framework needs further extension based on challenges companies face.

By revealing what the constituent elements of strategic capability management are, particularly, with respect to the contribution to strategic competitive advantages, it can be answered whether the earlier notion of SCaM complies with

978-1-4799-6410-9/14/$31.00 ©2014 IEEE

TABLE 1
OVERVIEW OF SEARCH RESULTS BY DATABASE

Keywords	ABI/ INFORM	Google Scholar	Scopus
'strategic capacity management'	11	9	18
'strategy' AND 'capacity management	1	25	4
'strategy' AND 'demand management'	1	14	3
'strategy' AND 'capacity planning'	3	21	5
Subtotal (each database)	16	69	30
Total		**115**	

these constituent components.

A. Methodology for the Systematic Literature Review

Since the term 'strategic capability management' does not seem to have been used at all, alternative keywords have been used for the search: 'strategic capacity management' and the combinations 'strategy' and 'capacity management', 'strategy' and 'demand management' and 'strategy' and 'capacity planning'. These keywords have been amalgamated with both 'manufacturing' and 'production'. In addition, Green et al. [14] advise to use at least two databases or search engines. By searching ABI/INFORM, Google Scholar and Scopus, the first 100 returns from each search, sorted on relevance, have been inspected on abstract and content; only articles published up until 2011 have been considered (see Table 1); we did find 115 papers.

B. Results from Literature Review

During the second step, these selected papers have been reviewed on their merits towards strategic manufacturing capabilities. During the review it also appeared that some of the finds addressed different domains, such as service management (e.g. [15][16]) and supply chain management [17]. If SCaM is recognised by other domains, then that justifies also investigating it for manufacturing companies.

The evaluation of the contents of the remaining papers constituted the third step of the systematic literature review. Since the main components of SCaM are: strategy, technology and organisation all articles were classified to one of these or listed as other; all 'other' papers appeared to be falling under a category that could be called 'planning and scheduling', from a strategic perspective. However, the strand of research that investigates planning and scheduling could be considered as part of (manufacturing) strategy and as part of organisational structures. Therefore, based on the literature review, the concept of SCaM sufficiently describes the core issues for strategic capability management, albeit that planning and scheduling from a strategic perspective should be accommodated.

As a fourth step those relevant papers that occurred multiple times during the search have been looked at closer. Armistead and Clark [15] propose a framework for capacity management in the context of service management (note: paper was discarded because of its focus). Also, Crandall and Markland [16] investigate the service industry to find that more emphasis is required on strategies for resource utilisation. Kathuria and Igbaria [18] investigate the importance of IT applications for manufacturing performance and van Mieghem's [19] work considers the capacity portfolio. The most complete view is found in Dekkers [10][20] and Orr [11], who argue that SCaM requires balancing strategy, technology and organisation; Sun and Riis [21] make a similar proposition for advanced manufacturing technology. Hence, the investigation of the papers occurring multiple times confirms the notion taking SCaM as starting point.

C. Framework for Strategic Capacity Management

The connection between Sun and Riis [21] and Dekkers [10][20] is described in Dekkers [22], commensurate with Orr [11]. Based on that connection, Dekkers [22] argues that four models are needed to describe the interaction between technology, organisation, and strategy, see Figure 1. By covering both steady-state processes and renewal processes, the conceptual notion of SCaM is also aligned with the notion of operational processes by Karlsson [23]and Gadde et al. [24], albeit they relate it to industrial networks, and with the argument for strategic renewal by Agarwal and Helfat [25]. Hence, operational processes should be placed symbolically at the heart of the framework for SCaM.

III. RESEARCH METHODOLOGY

Since 'strategic capability management' or SCaM itself has been hardly researched, the most appropriate research method seems to be the case study methodology. Following Yin [26], the primary unit of analysis is manufacturing (management) in industrial firms. Because of the construct of SCaM, consisting of separate components, guiding the data collection, the research has followed a structured path. Although, the research is exploratory, alternatives like qualitative interviews and grounded theory might be yielding less insight, given the exploratory nature of the research [27]. One reason for this is the availability of the predefined notion of SCaM, commensurate with Strauss' and Corbin's

FIGURE 1
FRAMEWORK FOR STRATEGIC CAPACITY MANAGEMENT

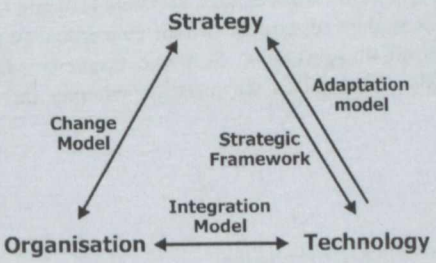

TABLE 2A: OVERVIEW OF MALAYSIAN CASES

Company	A	B	C	D	E
Employees	120	2500+	110	220	1200+
Product	Electronic components (MTO)	Electronic components (MTO)	Heat treatment (ETO)	Plastic components (MTO, MTS)	Durable cons. goods (MTO, MTS)
Challenges	• Inconsistent quality from main supplier • Rigid org. structure	• Quality problems from components suppliers.	• High variety • Unpredictable demand • Short lead-times	• Dependency on few major customers	• High degree of rework • Dependency on local market
Interviewees	• General manager • Manufact. manager	• Manufact. manager	• Managing Director • Production Executive	• General man. (manufact.) • Production Planning Man. • Quality man.	• Section manager • Production supervisor (2x)
Additional data		• Site visit		• Site visit	

TABLE 2B: OVERVIEW OF SCOTTISH CASES

Company	F	G	H	I
Employees	400	150	85	35
Product	Overhaul of propulsion units (MTO)	Supply of automotive parts (MTO)	Printing consumables (MTO, MTS)	Composite components (ETO, MTO)
Challenges	• Reduced volume calls on new org. structure and lay-out	• Quality problems from components suppliers.	• High variety • Unpredictable demand • Short lead-times	• Dependency on few major customers
Interviewees	• Manufact. manager • Project manager Change Team	• Managing Director	• Managing Director • Production Manager	• Managing Directors • Production Man. • Logistics man.
Additional data	• Site visit	• Site visit	• Site visit	• Site visit

[28] views. Quantitative surveys could result in superficial inferences, according to Johnson and Onwuegbuzie [29]. Shah and Corley [30] provide a good discussion on interpretive research and highlight that researchers have an obligation to meticulously collect incongruous data and develop elucidations of a particular phenomenon from the people who experienced it. The interest of this study is towards excavating the actual practises for SCaM in manufacturing firms for which the case study methodology appears to be the most suitable method to gain insights from practitioners.

Data have been collected from Malaysian and Scottish manufacturing firms. Malaysia is of interest since it has witnessed strong economic growth over the last three decades, i.e. 5.8% (Bank Negara Malaysia, Annual Report, 2012). Moreover, the manufacturing sector in Malaysia is experiencing substantial growth and consists of second tier suppliers [31]. Very contrastingly, the Scottish manufacturing industry is seen as to be struggling in the setting of a developed economy (e.g. [32]). Hence, the international dimension of this research will provide additional insight.

The cases from which data have been collected are depicted in Tables 2a (Malaysia) and 2b (Scotland). Given the structure of the Malaysian and Scottish manufacturing sector, the case studies should be considered as typical [27]. Furthermore, triangulation took place by factory visits, secondary data and consistency checks; for the latter, responses to the unstructured interviews were compared with components of the concept of SCaM, interviewees were asked to illustrate their responses and questioning proceeded until a complete and consistent picture emerged. Cases that did not fulfil this requirement were omitted from the study. Hence, a complete data set was obtained from all the cases considered in this study (see overview in Tables 3a [Malaysia] and 3b [Scotland] for the interaction models of SCaM).

IV. RESULTS

With regard to the relationship between strategy and technology assessment of technology, all companies experience very different competitive pressures resulting in different starting points for looking at technology. For Case A there was insufficient time to develop a technological plan due to immense pressures by orders accepted by sales and in the case of C quotations for customers (B2B) determine technological choices (note this is a small company). Cases B, F-I were seeking for production technologies and investments that would offer more flexibility. In terms of the adaptation model none of the companies followed a formal approach. Some, such as H, had adapted their planning and scheduling but not directly resulting systematic feedback from manufacturing and processing orders. Case F used TQM practices for optimisation but those resulted more in local optimisation than systemic optimisation. Hence, the relationship between strategy and technology seems weaker for the Malaysian companies with none of the nine cases

TABLE 3A: RESULTS FROM MALAYSIAN CASES

Company	A	B	C	D	E
Assessment of technology	• Insufficient time to assess production technologies.	• Man. cells introduced as more flexible production technology.	• Technology-driven plus tacit knowledge processes and mat.	• Cost pressures do not allow investment in manufacturing techn.	• Limitations of technology solved by new plant
Adaptation model	• Insufficient slack to improve prod. techn.	• N.A.	• No formal evaluation. • Pressure from orders.	• Improvements lead to cost-price reduction.	• Over-capacity lead to sub-optimum
Integration model	• N.A.	• N.A.	• Small company: flexibility in products and processes.	• Maintenance of equipment separated (communication?).	• Technology part of production line.
Change model	• Pressure from order book does not allow strategic change.	• Implementation of more flexible structure (hybrid line + man. cells).	• N.A.	• N.A.	• No approach to strategic change. • Planning and control approach historic.

TABLE 3B: RESULTS FROM SCOTTISH CASES

Company	F	G	H	I
Assessment of technology	• Changes in production techn. might induce buying rather than making.	• Up-to-date equipment under consideration (more flexible). • Re-investing in outsourced processes considered.	• Investment in flexible production capacity in addition to 'high volume'. • More integrated order processing.	• Investment in state-of-the-art production technologies.
Adaptation model	• Changes considered.	• Supply of automotive parts (MTO)	• Performance of production processes aligned with order processing.	• Planning and scheduling to be adapted. • Infrastructure below par.
Integration model	• Integration of technology in organisation.	• More flexible technologies might also be embedded in org. structures.	• Separate unit and communication for fast delivery. • Smaller batches.	• Introduction of manufacturing cells.
Change model	• Implementation of mixed-model production line. • Introduction Lean Prod.	• Move towards manufacturing cells and semi-autonomous groups. • Improved oper. planning.	• N.A.	• Semi-autonomous groups.

systematically optimising production technologies.

There was less information available on the integration model for technology and organisation. Although, manufacturing technologies have an impact on the organisation, none of the case studies seemed to follow a formal approach. Cases B, G and I had or were introducing manufacturing cells and G and I had identified semi-autonomous groups as adequate organisational concept. On this matter, there is little precedence in literature, too; most available papers will describe methods for assessing production technologies but not describe how technology and organisation are interrelated (except for works on socio-technical design of organisations). For all cases, it seems that adjustments in organisational structures are mostly seen as reactive than as pre-emptive. That means that from a production technology perspective changes in organisational considerations either are seen as trivial or simply ignored until the gap in performance becomes unacceptable.

For changes themselves in organisational structures there was more attention, albeit in different ways. For example, Case F was introducing Lean Production and a mixed model production line at the same time; that was seen as necessary to improve lead-time, to adapt to lower volumes and to reduce cost. Case B was only aiming at increasing flexibility due to smaller batches. It also appeared that some had made changes to the organisational structures in terms of adapting new strategies, albeit more focusing on control structures. For example, Case H did establish better communication channels between production, logistics and sales for the processing of orders that were to be delivered within 24 hrs. Ultimately, only few of the companies were implementing changes to the organisational structures and more as a reactive than pro-active mode.

V. DISCUSSION OF FINDINGS

The two sets of cases show differences. It should be noted that all Scottish and almost all Malaysian companies are suppliers. Most of all it seems that the Scottish companies are succeeding in setting out a manufacturing strategy, whereas the Malaysian companies are struggling more to make ends meet and consequent have hardly time for implementing a manufacturing strategy. That could be caused for part by the arm's length contracts of the Malaysian firms as suppliers, despite working closely with their customers (although those focused on cost). Separate from that explanation, there is no alternative account for that difference.

In addition, the Scottish companies are striving for more flexibility in manufacturing, whereas the Malaysian companies are seeking mostly to reduce cost. Again, for the latter that might be caused by the pressure of customers. It

could also indicate that the Scottish firms are more actively seeking for added value. The technological base for three out of the five Malaysian companies could be considered as 'manufacturing commodity' (Case C relies on unique technological knowledge and E delivers through intermediaries directly to customers). The Scottish companies were exploring or exploiting market niches (H, I) or having long-term relationships (F, G). Therefore, it can be carefully concluded that the different market position of the Scottish companies allowed them better to set out and implement manufacturing strategies, with both samples experiencing intense competitive pressures.

VI. CONCLUDING REMARKS

Using a holistic concept such as SCaM enabled to compare practices at Malaysian companies and Scottish ones. However, it is also clear that very different competitive situations and specific industrial sectors mean that such generic concepts should be applied in very different ways. At the same time, due to its specific nature, SCaM can only be applied and used accounting for contingencies. In that sense, it would be beneficial not only to increase the number of case studies for specific industries but also concentrate on specific aspects with large scale surveys.

ACKNOWLEDGEMENTS

The authors acknowledge the financial support by the Royal Society of Edinburgh and the University of Malaya (RG068-10SBS). Furthermore, appreciation is expressed to Muhamed Fadzil bin Repin, who supported the collection of data in Malaysia.

REFERENCES

[1] W. Skinner, "Manufacturing - missing link in corporate strategy," Harvard Business Review, vol. 47, pp. 136–145, 1969.

[2] R. H. Hayes and S. C. Wheelwright, Restoring Our Competitive Edge: Competing Through Manufacturing. New York: John Wiley & Sons, 1984.

[3] W. Skinner, "The focused factory," Harvard Business Review, vol. 52, pp. 113–121, 1974.

[4] K. Ferdows and A. De Meyer, "Lasting improvements in manufacturing performance: In search of a new theory," Journal of Operations Management, vol. 9, pp. 168–184, 1990.

[5] A. Größler and A. Grübner, "An empirical model of the relationships between manufacturing capabilities," International Journal of Operations & Production Management, vol. 26, pp. 458–485, 2006.

[6] M. Swink and W. H. Hegarty, "Core manufacturing capabilities and their links to product differentiation," International Journal of Operations & Production Management, vol. 18, pp. 374–396, 1998.

[7] P. T. Ward and R. Duray, "Manufacturing strategy in context: environment, competitive strategy and manufacturing strategy," Journal of Operations Management, vol. 18, pp. 123–138, 2000.

[8] R. G. Schroeder, K. A. Bates, and M. A. Junttila, "A resource-based view of manufacturing strategy and the relationship to manufacturing performance," Strategic Management Journal, vol. 23, pp. 105–117, 2002.

[9] M. Tracey, M. A. Vonderembse, and J.-S. Lim, "Manufacturing technology and strategy formulation: keys to enhancing competitiveness and improving performance," Journal of Operations Management, vol. 17, pp. 411–428, 1999.

[10] R. Dekkers, "Strategic capacity management: meeting technological demands and performance criteria," International Journal of Production Research, vol. 40, pp. 3895–3911, 2002.

[11] S. Orr, "The Role of Capacity Management in Manufacturing Strategy: Experiences from the Australian Wine Industry," Technology Analysis & Strategic Management, vol. 11, pp. 45–63, 1999.

[12] P. Cronin, F. Ryan, and M. Coughlan, "Undertaking a literature review: a step-by-step approach," British Journal of Nursing, vol. 17, pp. 38–43, 2008.

[13] D. Tranfield, D. Denyer, and P. Smart, "Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review," British Journal of Management, vol. 14, pp. 207–222, 2003.

[14] B. N. Green, C. D. Johnson, and A. Adams, "Writing narrative literature reviews for peer-reviewed journals: secrets of the trade," Journal of Chiropractic Medicine, vol. 5, pp. 101–117, 2006.

[15] C. Armistead and G. Clark, "The "Coping" Capacity Management Strategy in Services and the Influence on Quality Performance," International Journal of Service Inndustry Management, vol. 5, pp. 5–22, 1994.

[16] R. E. Crandall and R. E. Markland, "Demand Management - Today's Challenge for Service Industries," Production and Operations Management, vol. 5, pp. 106–120, 1996.

[17] G. A. Farley, "Discovering supply chain management: a roundtable discussion," APICS - The Performance Advantage, vol. 7, pp. 38–39, 1997.

[18] R. Kathuria and M. Igbaria, "Aligning IT applications with manufacturing strategy: an integrated framework," International Journal of Operations & Production Management, vol. 17, pp. 611–629, 1997.

[19] J. A. Mieghem, van,, "Capacity Management, Investment, and Hedging: Review and Recent Developments," Manufacturing & Service Operations Management, vol. 5, pp. 269–302, 2003.

[20] R. Dekkers, "Strategic Capacity Management: Balancing Technological Demands and Performance Criteria," Journal of Materials Processing Technology, vol. 139, pp. 385–393, 2003.

[21] H. Sun and J. O. Riis, "Organizational, technical, strategic, and managerial issues along the implementation process of advanced manufacturing technology—a general framework of implementation guide," International Journal of Human Factors in Manufacturing, vol. 4, pp. 23–36, 1994.

[22] R. Dekkers, (R)Evolution, Organizations and the Dynamics of the Environment. New York: Springer, 2005.

[23] C. Karlsson, "The development of industrial networks: Challenges to operations management in an extraprise," International Journal of Operations & Production Management, vol. 23, pp. 44–61, 2003.

[24] L.-E. Gadde, L. Huemer, and H. Håkansson, "Strategizing in industrial networks," Industrial Marketing Management, vol. 32, pp. 357–364, 2003.

[25] R. Agarwal and C. E. Helfat, "Strategic Renewal of Organizations," Organization Science, vol. 20, pp. 281–293, 2009.

[26] R. K. Yin, Case study research: design and methods. London: Sage, 1994.

[27] B. Flyvbjerg, "Five Misunderstandings About Case-Study Research," Qualitative Inquiry, vol. 12, pp. 219–245, 2006.

[28] A. C. Strauss and J. Corbin, Basics of Qualitative Research Techniques and Procedures for Developing Grounded Theory. London: Sage, 1998.

[29] R. B. Johnson and A. J. Onwuegbuzie, "Mixed Methods Research: A Research Paradigm Whose Time Has Come," Educational Researcher, vol. 33, pp. 14–26, 2004.

[30] S. K. Shah and K. G. Corley, "Building Better Theory by Bridging the Quantitative-Qualitative Divide," Journal of Management Studies, vol. 43, pp. 1821–1835, 2006.

[31] R. Mahadevan, "Assessing the output and productivity growth of Malaysia's manufacturing sector," Journal of Asian Economy, vol. 12, pp. 587–597, 2001.

[32] NESTA, "Science and Innovation Strategy for Scotland: NESTA Response to Consultation," NESTA, London2007.

UNIVERSITI
MALAYA

UM.R/SM/636/4/2014 - PA-13685

Tarikh : 11 SEP 2014

Dr. Kanagi A/p Kanapathy
Jabatan Operasi Dan Pengurusan Sistem Maklumat
Fakulti Perniagaan & Perakaunan
Universiti Malaya

Tuan/Puan,

IEEM2014 THE IEEE INTERNATIONAL CONFERENCE ON INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT di SUNWAY RESORT HOTEL AND SPA PADA 09 DEC 2014 HINGGA 12 DEC 2014

Dengan segala hormatnya perkara di atas dirujuk.

2. Sukacita dimaklumkan bahawa pihak Universiti telah bersetuju meluluskan permohonan tuan/puan seperti berikut:-

1) Cuti khas mulai : **09 DEC 2014 hingga 12 DEC 2014 (4 hari)**
Dengan ini baki cuti khas tuan/puan bagi tahun 2014 adalah **12 hari**

2) Bantuan Kewangan : **Peruntukan Persidangan (Bantuan Sederhana)** meliputi mana-mana yang berikut :

Perjalanan(rumah/KLIA,lapangan terbang/hotel/tempat persidangan)
Elaun Makan (RM 60 X 4 hari - 60%)
Yuran pendaftaran

3. Tuan/Puan dikehendaki mengemukakan:

i) Laporan mengenai persidangan yang dihadiri dalam masa dua minggu selepas persidangan melalui Ketua Jabatan. (Sila muatturun dari Portal UM) ke Unit Perkhidmatan
ii) Satu set kertas kerja/prosiding tersebut kepada Perpustakaan , Universiti Malaya.
iii) Bukti bahawa kertas kerja tersebut telah dihantar untuk diterbitkan di dalam jurnal dalam tempoh tiga(3) bulan selepas persidangan

4. Sila berurus terus dengan Pejabat bendahari mengenai bantuan yang telah diluluskan. Bantuan kewangan yang telah diluluskan tidak boleh dipindahmilik dan tuntutan hendaklah dikemukakan dalam tempoh sebulan selepas kembali dari menghadiri persidangan di atas.

Sekian, dimaklumkan

Yang Benar,

Natrah Binti Mat Junos
Penolong Pendaftar
Bahagian Sumber Manusia
Jabatan Pendaftar
b.p. Pendaftar

Peruntukan yang diluluskan tidak melebihi **RM 2806**

Surat ini adalah cetakan komputer dan tidak memerlukan tandatangan