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LEADERSHIP, DESIGN PROCESS AND TEAM PERFORMANCE: A COMPARISON BETWEEN JAPANESE AND AUSTRALIAN R&D TEAMS

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ABSTRACT

In business, innovative design can build long-term competitive sustainability that leads to superior performance of organisations. As a result, public and private firms have invested enormously in design and innovation through their research and development (R&D) activities. This study aims: a) to examine the perceptions of Australian and Japanese R&D teams toward design leadership, design process and team performance and satisfaction and b) to compare the perspections between R&D teams in Japan and Australia. The results from 159 R&D teams in Japan and Australia reveal that there is a significant difference between Japanese and Australian R&D teams on design leadership and team performance. Discussion of the results and implications are also given.

JEL Classification: M12 & M54

Keyword: Leadership, Design process, Team performance, Satisfaction, Research and Development, Japan, Australia

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INTRODUCTION

Design is a dynamic process that is never finished and is always updated with new innovative ideas in order to meet customers' needs and requirements (Krishnapillai & Zeid, 2006). It is a form of strategic resource that is important to wealth creation because it has a critical influence on the initial conception and delivery of products and services that meet customer expectations and aspirations (Topalian 2002). From the very beginning of this process - idea development- leadership could play a facilitative role in the generation of innovative solutions to meet customers' preferences. However, based on existing evidence, little is known about the impact of leadership on the product design process, or how the quality of leadership might play a role in creating business competitive advantages through the design process.

To date, there is still no empirical attempt that has been made to propose an accepted measure for design leadership let alone to assess the impact of design leadership on the product design process. Design leadership is important since it is one of the most significant means of generating new ideas, making tangible market expectations met through research and rehearsals of user experiences, contributing added value and differentiating in a cost effective way (Topalian 2002). Based on initial idea of what constitute design leadership by Turner & Topalian, (2002), this study intends to fill the gap in the literature by assessing its impact on the design process and team performance.

Organisations operating in Japan and Australia were chosen because of relatively high investment in research and development (ODEC, 2010) and the increasing importance on design and innovation to support high-value advanced manufacturing to sustain economic growth. Japan and Australia are among the highest ranked

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countries in terms of the growth of R&D expenditure over the last ten years. While Japan is ranked the 4th highest on R&D expenditure in the world, Australia's expenditure on R&D has increased from 1.51% of GDP in 2000 to 2.06% in 2006 (OEDC, 2010). The purposes of this study are to examine the perceptions of Australian and Japanese R&D teams toward design leadership, design process and team performance and satisfaction and to compare the perspections between R&D teams in Japan and Australia.

LITERATURE REVIEW

Design Leadership

Design leadership can be defined simply as the '…means both to design and to lead - to lead design and to lead business by design' (Design Management Institute, 2006, p.2) and is also described as a form of leadership that creates and sustains innovative design solutions (Turner & Topalian, 2002). These authors also argued that the qualities of design leadership are displayed through design leaders' core responsibilities such as envisioning the future, manifesting strategic intent, directing design investment and creating and nurturing an environment of innovation. A number of academics and business practitioners believe that leadership makes an important contribution to the process of design and innovation and as a result creates a company's sustainable competitive advantage (see Design Management Institute, 2006).

Gloppen (2009) suggests that success in today's markets and those of the future depends heavily upon market leadership through the use of design. Business leaders are required to know more about how to effectively use design. Design leadership will assist firms to obtain full return on investment in their design. Based on her review of literature, she also made a distinction between design leadership and design management. She describes design managers as those who optimize resources to implement programs in the most effective and profitable manner whereas, design leaders are those concerned with innovation, design and strategy.

In the innovation-oriented competitive environment, designers must be able to master not only the design of the product itself, or the translation of brand values or strategies alone. A design leader must possess the ability to be visionary, imaginative, and obtain enough business competence to present and display the entire business concepts (Roald 2006). The author also adds that a future design leader has to be able to converse in ways that both business and technology trained people understand, and to provide critical arguments over design development and consider strategic and financial implications associated with the design. Therefore, leaders involve in any sort of design must equipped themselves not only with good qualities of leadership but be able to transform innovative ideas into strategic advantage for the firm.

Design process

The design process is one of the major tasks for any firm who is involved in design activities, whether it is a new product design and development or process design and development. By combining these two design activities, organisation shapes the scope of the transformation process by determining the types of inputs required and outputs generated. In this stage, there is integration of multiple groups or stakeholders, both internally with other functions and externally with stakeholders, customers and suppliers (Sroufe et al. 2000). Rungtusanatham & Forza (2005) also agree that product design or manufacturing process design need to be coordinated, rather than being treated as independent sets of decisions and activities occurring sequentially in time. Hoozee and Bruggeman (2010) examine how collective workers participation and leadership style influence the emergence of operational improvements during the design process of a time-driven activity-based costing (ABC) system in a case study setting. Their findings suggest that collective worker participation and appropriate leadership styles are indispensable during the design process of a time-driven ABC system.

There are several stages that involved in the design process. According to Khandani (2005), design process begins with defining the problem, gathering pertinent information, generating multiple solutions, analyzing and selecting a solution and testing and implementing a solution. Meyer (1993) suggests that new product development should consists of seven linked stages which include advance research, product concept, product specification, product development, pilot product, production and reincarnation or disposal. Based from these suggestions, there are three major stages of design process that will be introduced in this study that will include idea generation, design development and design evaluation.

Based on the different stages that occur during the design phase, it shows that there are different sets of activities and different constituents that were involved throughout the design process. A leader that can integrate all

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of these activities and monitor the coordination of work at different stages can help to ensure the effectiveness of the design process. For example, Formoso et al. (1998) suggest that the performance of the design process in the building industry has a major influence on the success of the following processes in construction projects and also the quality of the final design. As pointed out by Ferguson (1986) that poor design process was the main cause for defects in building and production stage.

R&D team performance

Researchers have emphasised that innovative design can assist corporations in creating product differentiation, developing competitive advantage and reinforcing excellent performance that can be sustainable into the future (i.e. Hargadon, 2005; Turner 2006). Companies, such as Apple, Lego and Toyota, have heavily invested in 'designing and innovating the difference' (Design Management Institute; 2006) which has resulted in them becoming world-class companies and prominent players in their industry sectors through the integration of technological advancements based on R&D processes.

In their study of 44 R&D teams, Kratzer, Leenders & Engelen (2006) found that creative team performance is affected by the proximity of team members, the communication modes chosen and the manner in which the team is organized. Changes in the business environment have had a significant effect on the way in which R&D is carried out. The knowledge needed for the development for most new products has become increasingly concentrated and particular. Therefore, R&D projects need in-depth mastery of specialized knowledge and skills. The results revealed that the more variable R&D teams are in the manner in which they employ these three variables, the better their creative team performance.

METHODS AND RESULTS

The study employed quantitative survey targeting managers or supervisors of R&D teams in Japan and Australia. Approximately 600 questionnaires were distributed in both Japan and Australia with 165 questionnaires returned, representing approximately 27.5% response rate. Among the 165 returned questionnaires, 159 were determined to be useable based on considerations of missing value analyses (all missing values were replaced using series mean values). The final sample consisted of 159 supervisors or managers of R&D teams in Japan and Australia.

A series of reliability check were conducted in this study to provide evidence that the four constructs, Design Leadership, Design Process, Team Satisfaction and Team Performance, produced the data for which they were designed. The values of Cronbach alpha produced, were alpha = 0.920 (Design Leadership), 0.733 (Design Process), 0.777 (Team Performance) and 0.734 (Team Satisfaction). The reliability values indicated that the scales were highly reliable as they were greater than 0.70 (Nunnally, 1967).

Participants

Based from Table 1, majority of respondents were aged between 31-40 years old with 54.1%. About 22.6% were aged between 41-50 years and only 5% were respondents aged above 51 years. The remaining respondents were aged 30 and under. There were 116 male and 42 female respondents involved in this study representing 73% and 26.4% respectively of the sample population. Regarding their highest education level, approximately about 90% of respondents have at least a Degree/Bachelor or higher qualification. Finally, there were about 84 Japanese respondents and 74 Australian respondents involved in this study.

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TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Characteristics	n	%	Characteristics	n	%
Age (years)			**Highest Education Level**		
Below 25	4	2.5	Secondary Education	5	3.1
25 – 30	25	15.7	Certificate/Diploma	11	6.9
31 – 40	86	54.1	Degree/Bachelor	102	64.2
41 – 50	36	22.6	MBA	29	18.2
Above 51	8	5.0	PhD/Doctorate	11	6.9
			Missing	1	.6
Gender					
Male	116	73.0			
Female	42	26.4			
Missing	1	.6			
Nationality					
Japanese	85	53.5			
Australian	74	46.5			

Mean scores of Design Leadership, Design Process, Team Performance and Team Satisfaction (Japanese and Australian teams)

When combining data from both groups, design leadership scored a mean of 2.84 whereas design process has a mean score of 3.17. Between two dependent variables, team satisfaction (M=3.07) scored higher mean than team performance (M=2.93). Regarding dimensions of design leadership, directing design investment has the highest mean score (M=2.89) and followed by Manifesting Strategic Intent (M=2.85), Envisioning the Future (M=2.81) and Creating and Nurturing an Innovative Environment (M=2.80) respectively. For dimensions of design process, design development stage scored the highest mean (M=3.20).

Table 2 reports Australian respondents' mean and standard deviation scores for all variables and their respective dimensions. It was demonstrated that, the mean scores for all variables and their respective dimensions of Australian respondents were slightly higher than the combined mean scores as reported above. It indicates that Australian respondents perceived that their leaders give a little bit more concern and attention towards design leadership and design process as well as on team performance and satisfaction as compared to Japanese respondents' perception on their leaders.

Total design leadership scored a mean of 2.94 and directing design investment dimension has the highest mean score of 3.04. For total design process, a mean score of 3.22 was obtained. But at dimension level, evaluation of design is perceived to be mostly important. Perhaps, the conformity and evaluation of the design to specification and user's requirement is perceived as important for the success of a particular design. Similar results were produced for dependent variables in which team satisfaction (M=3.13) scored a higher mean than team performance (M=3.05).

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TABLE 2: MEAN SCORES OF AUSTRALIAN RESPONDENTS

Measures	Mean	SD
Design Leadership	2.94	.43
Envisioning the Future	2.92	.49
Directing Design Investment	3.04	.50
Manifesting Strategic Intent	2.96	.47
Creating and Nurturing an Innovative Environment	2.87	.50
Design Process	3.22	.36
Idea Generation	3.15	.54
Design Development	3.25	.42
Evaluation of Design	3.27	.40
Team Performance	3.05	.38
Team Satisfaction	3.13	.47

Table 3 reports Japanese respondents' mean and standard deviation scores for all variables and their respective dimensions. Overall, mean scores of Japanese respondents were slightly lower than the combined mean scores of all variables (see above). Total design leadership scored a mean of 2.74 with directing design investment dimension scored the highest mean, same as the perception of Australian respondents. Total design process scored a mean of 3.12, but for Japanese respondents, they perceived design development dimension as the most important stage in the design process. They perceived the process of bringing the idea into actual prototype of the design is critical to the success of design process. Similar results were produced between dependent variables when team satisfaction (M=3.01) scored a higher mean than team performance (M=2.82).

TABLE 3: MEAN SCORES OF JAPANESE RESPONDENTS

Measures	Mean	SD
Design Leadership	2.74	.66
Envisioning the Future	2.71	.77
Directing Design Investment	2.77	.70
Manifesting Strategic Intent	2.76	.71
Creating and Nurturing an Innovative Environment	2.73	.69
Design Process	3.12	.42
Idea Generation	3.10	.60
Design Development	3.16	.47
Evaluation of Design	3.11	.46
Team Performance	2.82	.63
Team Satisfaction	3.01	.70

Comparisons between Japanese and Australian toward Design Leadership, Design Process, Team Performance and Team Satisfaction

Table 4 presents T-test results intended to further examine whether there is any statistical difference in the mean scores between Japanese and Australian respondents towards the four variables in this study. As can be seen from

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the table, there is not a statistical significant difference in the mean scores of design process and team satisfaction between Australian and Japanese respondents. But there is a statistical significant difference in the mean scores for design leadership and team performance between design leadership and team performance.

The mean score for design leadership of Australian respondents was 2.94 as compared to 2.74 for Japanese respondents, $t(159) = 2.249$, $p < 0.05$. Whereas, the mean score for team performance of Australian respondents was 3.05 as compared to 2.82 for Japanese respondents, $t(159) = 2.870$, $p < 0.05$.

TABLE 4: T-TEST RESULTS

Variables	Mean Australian	Mean Japanese	T-value	Significant
Design Leadership	2.94	2.74	2.249	.026
Design Process	3.22	3.12	1.613	.109
Team Performance	3.05	2.82	2.870	.005
Team Satisfaction	3.13	3.01	1.257	.211
N	74	85		

DISCUSSIONAND CONCLUSION

The results in this study reveal that, by comparing between Japanese and Australian respondents, Australia R&D managers seems to see themselves significantly practicing more on design leadership behavior than Japanese R&D mangers. The possible reason could be because leadership behaviours that associate with design leadership such as creating and communicating vision, establishing strategic direction and nurturing creative environment, tend to be more embedded within the Western leadership practices such as Australian leadership behaviours (Muenjohn, Armstrong, and Francis, 2010; Gelfand et al. 2007; Wendt et al. 2009; Dickson et al. 2003). It was also found that Australian R&D managers tend to rate their R&D team significantly higher on team performance than Japanese R&D managers rate their own R&D team. The result, however, does not imply that Japanese R&D teams are having poorer 'actual' performance than Australian R&D teams, rather than indicating the perception of Australian and Japanese R&D managers. Perhaps, the current result seems to associate with the self-inflation on leadership observed by several studies (e.g. Muenjohn, Armstrong and Hoare, 2012; Adamson, 1996; Atwater and Yammarino, 1992).

The results found in this study have made a number of implications and contributions. The findings contribute to the limited empirical literature on design leadership and filled the research gap of how design leadership and team performance and satisfaction could be perceived by specialist teams in two different countries. Their perception differences on design leadership and team performance could indicate different role of leadership that play in team performance and satisfaction and therefore R&D managers should cautionally treat and display their leadership behaviours as it could affect their team outcomes.

In conclusion, this study aims to examine the perceptions of Australian and Japanese R&D teams toward design leadership, design process and team performance and satisfaction and to compare the perspections between R&D teams in Japan and Australia. The results reveal that there is a significant difference between Japanese and Australian R&D managers on design leadership and team performance. Not only does this study contribute to the development of the new approach to leadership, Design Leadership, but also it has practical applications for team leaders who seek to improve team performance and satisfaction.

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