Approach to Analyze the Organizational Characteristics for Being an Innovative Organization

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Abstract – **Innovation has become an important weapon for an organization to sustain its competitiveness under today's business dynamic. This paper aims to propose the idea how to develop a model to assess the organizational characteristics for being an innovative organization. With the development of the model, it would help the top management of any organization determines proper strategies to fill in the strategic gaps between the current and future requirements for becoming an innovative organization.**

I. INTRODUCTION

In the era of globalization, organizations face with fierce competition and high pressure to survive in their business uncertainty. Consequently, firms have to find new strategies including product and service differentiation, strategic alliances, or cost leadership to create new values for developing their competitive advantages and coping customer needs [1]. Among a variety of alternatives, innovation has become an essential strategy to respond organizational goals in order to promote a sustainable organization. According to the survey of Boston Consulting Group in 2012, the results show that seventy-six percent of fifty CEOs from major companies in the world ranked innovation as the top three strategic priorities to increase corporate performance [2].

In order to organize and manage innovation activities effectively, the executives should evaluate their current organizational position before setting corporate strategies. However, from the existing literature, the study on a measurement model to assess the level of organizational characteristics for being an innovative organization has not been explored in a greater detail. Therefore, this study intends to present a conceptual model for the management team of an organization to measure the current level of key organizational characteristics for being an innovative organization. Furthermore, it can analyze areas needed for improvement in order to set proper corporate strategies in leading an organization to become an innovative organization. With this analysis, the executives can effectively allocate resources to the areas needed for improvement.

The structure of this paper starts with the literature review on the innovative organizations and the assessment of organizational characteristics for being an innovative organization. Secondly, the problem statement and objective are described. The next part presents the five steps for analyzing the level of organizational characteristics along the key dimensions influencing the development of innovative organization. Then, the discussion on the strategic gaps between the current level and future requirement for being an innovative organization will be presented.

II. LITERATURE REVIEW

The literatures were reviewed to address the definition of an innovative organization, key characteristics of an innovative organization, and innovation measurement.

A. The definition of an innovative organization

The definition of an innovative organization has been given by many researchers based on the context and perspective. For example, an innovative organization is a firm promotes innovation activities over a period of time to sustain organizational competiveness and increase corporate performance [3, 4]. Although, an innovative organization is still no precise definition, it can be defined based on something in common that an innovative organization means a firm always create, learn and develop new products, processes, methods, services or ideas through all organizational resources to utilize new values into the markets as well as stakeholders for sustaining organizational competitiveness [3, 5-8].

B. The key characteristics of an innovative organization

The characteristics of an innovative organization can be addressed into five key areas:

1) Organizational structure

Several scholars suggest that an innovative organization should change its structure or working process to enhance the competitiveness. They also mention that a flat organization with low formalization and high flexibility are proper for managing innovation activities [9-11].

2) Organizational climate and culture

The strong innovation culture has a positive effect to organizational performance [12]. For example, under the innovation environment, inferiors are more likely to share new ideas to leaders than concern about their mistakes [13, 14].

3) Learning organization

A number of scholars identify that improving the learning process by increasing employee competence and creating new knowledge must be a nature of innovative organization to respond their customer needs and gain competitive advantages [15-19].

4) Leadership style

Many cultural researchers mention that leaders are a key driver to develop innovation activities and innovative environment in an organization [20-22]. Moreover, team leader behavior has a strong effect to organize a productive innovation team such as clarifying goals, encouraging participation, eliminating conflicts and evaluating performance [23].

5) Strategic alliances

Researchers address that the synergy with external sources is one of a key processes to improve innovation performance through circulating knowledge and information [24], providing new ideas and technologies [25], increasing speed and saving production costs [26].

C. Innovation measurement

The issues of innovation measurement have been significantly studied by academics and practitioners [27-30]. Several methodologies and indicators for evaluating the innovation competence have been developed in which they can be classified into two groups. The first group of researchers emphasizes on the outcomes of innovation development in order to see how organizations effectively manage innovation activities such as measuring the level of innovativeness by counting the number of innovative products during a given time or the percentage of revenue generated from innovative products, etc. The other group of researchers concentrates on the process and approach of innovation development in an organization such as measuring the level of organizational characteristics for being an innovative organization. For instance, the Innovation Diamond model is applied to assess key factors for new product development [31]. Furthermore, Adams *et al.* propose seven dimensions, which are inputs, knowledge management, strategy, organization and culture, portfolio management, project management and commercialization to measure the innovation management [27]. Two groups of innovation measurements from the current literature are presented in Table 1.

1) Focusing on the outcome of innovation development - the measurements can be classified into three groups which are input, output and multiple indicators

Innovation inputs are used as the criteria to evaluate the organizational capabilities in many studies. For instance, Vega-Jurado et al. mention that internal organizational competence has a positive influence on the degree of product innovation [40]. Expenditures on innovation development such as R&D activities, training and marketing processes are applied as the main indicators for measuring an innovative organization [27, 41].

Another group of researchers believes that input indicators are controllable and predictable. Therefore, they are not proper for measuring the level of innovativeness because the results will be biased [42]. Instead, a variety of output indicators should be considered to measure the organizational capabilities. Generally, a number of new products during a given time and the number of patents are used as the criteria [32, 43]. The study of Verhoef and Leeflang indicates that the results from marketing activities such as a number of new products in the markets, market share, revenue and customer satisfaction can utilize to measure innovation performance of an organization [28].

The other group of scholars argues that degree of innovativeness cannot be measured by a single-dimensional construct because the relationship between organizational innovativeness and organizational performance is complex [29, 30, 44, 45]. Consequently, multiple-dimensional criteria are significantly applied to measure the innovation outcomes [34, 35]. For instance, Griffith *et al.* explore the link between R&D expenditure and organizational productivity to measure the level of innovativeness in a firm [33].

2) Focusing on the process and approach of innovation

Different methodologies and models have been developed to measure organizational characteristics for supporting an innovative firm [27, 37, 39]. Morris introduces an innovation funnel with the nine steps of innovation development. He measures every step of innovation process through several indicators including qualitative and quantitative methods [36]. The various measurement models are applied to evaluate the organizational components for process

TABLE 1: INNOVATION MEASUREMENT FROM SEVERAL SOURCES

Aspects of Innovation Measurement	Description	Sources
Focusing on the outcome of innovation	Many scholars use inputs (R&D expenditure, internal resources), outputs (number of new products, number of patents, market share) or combination of indicators for measuring the level of innovativeness in a firm.	Van den Bulte [32]; Adams *et al.* [27]; Verhoef and Leeflang [28]; Griffith *et al.* [33]; Van Mote *et al.* [34]; Rothaermel and Hess [35]
Focusing on the process and approach of innovation	Various methodologies and models such as Government Performance and Results Act (GPRA), Competing Values Framework (CVF), Innovation Diamond and Performance Measurement System (PMS) are applied to analyze the characteristics of innovative organization.	Morris [36]; Huang and Lin [37]; Adams *et al.* [27]; Cooper and Kleinschmidt [31]; Cavalluzzo and Ittner [38]; Cameron and Quinn [39]

development. For example, the study of Cavaluzzo and Ittner used the Government Performance and Results Act (GPRA) to identify the relationships among firm's characteristics and innovation performance [38]. Furthermore, the Innovation Diamond was employed to evaluate four key dimensions for driving the new product development [31].

III. PROBLEM STATEMENT

As previously mentioned, innovation becomes a key engine for firms to develop and sustain their competitiveness. Executives are not able to manage their innovation activities effectively if they do not know the current level of their organizational characteristics and the areas needed for improvement. However, the development of measurement model for assessing firm's characteristics for being an innovative organization and determining a strategic direction to improve organizational innovativeness is still limited. Without the assessment model, it is quite difficult for managers to know and prioritize the areas needed for improvement as well as it is hard to set proper strategies for the development to become an organization.

IV. OBJECTIVE AND PROPOSED APPROACH

Although the focus of this paper presents the idea, the ultimate goal of this research aims to develop an analytical model to measure the existing level of organizational characteristics along key dimensions such as organizational structure, culture or leadership style. The measurement model will present the strategic gaps based on the difference between the current level of key characteristics for being an innovative organization and targets. As a result, areas needed for improvement will be identified. Thus, the top management can make proper strategic decisions for developing an organization to become an innovative organization.

The approach for assessing the organizational characteristics is proposed in five steps. The first step is to identify the key characteristic dimensions for an organization to be an innovative organization. The second step is to assess the level of organizational characteristics along key dimensions. The third step is to determine the indicators or key performance indexes (KPIs) to evaluate the level of an organizational position. Next, the benchmark is set to present a target for each dimension. The last step, an analytical model is applied to show gaps between the existing level of key characteristics for being an innovative organization and benchmarks. The research approach is presented in Fig 1.

Step1: Identify the key characteristic dimensions for an organization to be an innovative organization

To develop a measurement model, the key dimensions influencing the development of innovative organization have to be identified. Extending from the research of Chutivongse and Gerdsri on 'Key Factors Influencing The Development of Innovative Organizations: An Exploratory Study' in the PICMET Conference 2011 [46], we rerun the analysis by focusing only the key attributes that have been identified in the literature and also been addressed by the Thai executives through a series of interview. With this arrangement, it ended up with 25 attributes in common. Then, the factor analysis was applied to extract and group the attributes into the key factors promoting an innovative organization. For factor analysis, the Kaiser-Meyer-Olkin (KMO) and the Bartlett test of sphericity were conducted to test the data adequacy. The KMO is 0.828 and the Bartlett test of sphericity is 767.281 at the 0.000 significance level indicating that the correlations among variables are significant. Furthermore, the Cronbach's alpha was used to test the internal consistency of the five factors. Generally, the Cronbach's alpha about 0.6 has usually been accepted in the organizational research [47]. Therefore, all of five factors met the minimum criteria. The results presents in Table2

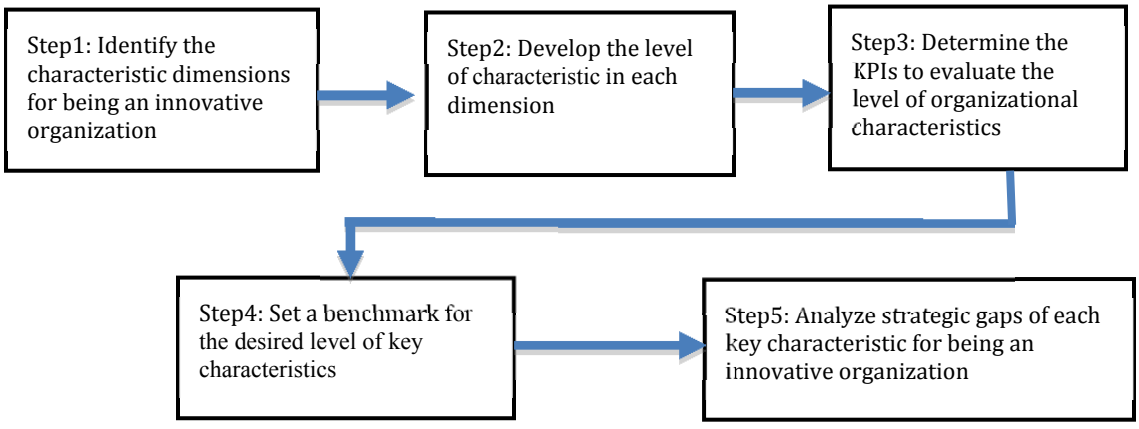

Figure 1: Approach for assessing the organizational characteristics

TABLE 2: CRONBACH'S COEFFICIENT ALPHA VALUE

Factor	Cronbach alpha	KMO value	Barlett test of sphericity
Factor 1	0.852	0.828	767.281 (at 0.000 significance level)
Factor 2	0.834		
Factor 3	0.716		
Factor 4	0.824		
Factor 5	0.587		

TABLE 3: THE RESULT OF FACTOR ANALYSIS

Variables	Factors				
	1	2	3	4	5
Your organization possesses sufficient technological resources to facilitate the development.	0.869				
Your organization provides sufficient sources of information to facilitate the development.	0.822				
Your organization possesses sufficient financial resources to facilitate the development.	0.774				
Rewards and incentives are set to foster innovation within your organization.		0,818			
Your organization always learns from past experiences and applies it to the future.		0.771			
Your organization emphasized human resource development as a significant factor by continuously providing training courses supporting innovation activities.		0.667			
Even during tough economic times, such as the hamburger crisis, your organization still supports innovation activities.		0.665			
Your organization always motivates employees to think positively		0.534			
All employees recognize the organization's goal in promoting innovation.			0.825		
With a clear and definite goal, all employees have the same direction to achieve the organization's objectives.			0.756		
Your organization always co-operate with other firms through outsourcing or partnership in order to obtain new ideas.			0.558		
Your organization allows every employee to have free expressions.				0.752	
The work environment in your organization is more like a family approach, which allow easy communication.				0.701	
Ideas can be exchanged among organization's members without conflicts.				0.651	
The process of transferring new technologies within your organization is effective even with changing of the responsible persons.				0.570	
Your organization has a specific process to systematically plan the implementation of creative ideas.					0.884
Your organization continuously improves and re-invents new work process.					-0.609
Eigen Value	6.734	1.615	1.456	1.190	1.025
Variance explained	39.609	9.501	8.565	7.002	6.032
Cumulative variance explained	39.609	49.110	57.675	64.677	70.710

Through the factor analysis, 17 attributes were grouped into five factors that explain 70.71% of the cumulative variance explained. The results present in Table 3:

These five factors are named as:

1. Management support Human
2. Resource Development (HRD) supporting organizational learning and personal development
3. Vision and goal sharing
4. Organizational culture for communication
5. Work process

The result indicates that management support, human resource development (HRD) supporting organizational learning and personal development, vision and goal sharing, organizational culture for communication and work process are the key factors supporting Thai organization to become innovative. Therefore, these five factors can be applied as the key dimensions to assess the characteristics of being and innovative organization.

Step 2: Develop the level of organizational characteristics along the key dimensions

In order to identify the existing position of organizational characteristics in each dimension, the level of organizational characteristics influencing the development of innovative organization have to be developed. The level of organizational characteristics can be developed through expert panels (from academics and practitioners), literature review and database from organizations in various industries. For example, the levels of characteristic in the area of human resource management can be divided into four levels as shown in Table 4. Since this paper proposes a conceptual model, the final design of the model is still under the development at this stage.

Step 3: Determine the KPIs to evaluate the existing level of organizational characteristics

This step will identify the KPIs used for measuring the conditions representing the level of organizational characteristics in each dimension. Both qualitative and

quantitative methods can be applied to identify the current level of each characteristic. For instance, several scholars mention that the training program becomes a basic element of the human resource development factor [48-50]. The study of Amabile concludes that high freedom to employees for selecting the methods or sources of new ideas to achieve the goals has a positive effect on the organizational outcomes [49]. Moreover, the number of training course has a direct impact to employees' capabilities [51]. Then, these two indicators are applied to measure the level of organizational characteristic under human resource development aspect as presented in the table 4. However, these are just examples so more KPIs need to be identified for all dimensions.

Step 4: Set the benchmark for the desired level of key characteristics for being an innovative organization

The benchmark is used as the target for future development in each dimension. There are two methods to set the benchmark:

1) Expert panel: A group of experts can be identified from different parts of organizational departments (e.g. marketing, R&D, finance, etc.) to set the desirable targets for development (also called a benchmark) [42, 52]. Phan also mentions that an expert can be either academics or practitioners who have more experience in a particular field [42].

2) Database method: it is one of the most popular methods to set an organizational target. The data from organizations that are regarded as innovative organizations can be used as the benchmark to compare with other firms in the same industry [42]. For instance, 3M Corporation has explored and sustained innovation activities for over a century so it becomes one of the great benchmark with any identified organization [53-55].

Step 5: Analyzing the strategic gaps of organizational characteristics in each dimension

Mosley and Mayer state that a radar chart is more useful to compare organizational capabilities than other methods when an organization needs to measure their performance in multiple dimensions [56]. Then, a radar chart is applied as a tool for presenting the strategic gaps between the existing level of key characteristics for being an innovative organization and the benchmark. As previous mention, this study applies five key factors which are management support, human resource development (HRD) supporting organizational learning and personal development, vision and goal sharing, organizational culture for communication and work process as the key dimensions to assess the characteristics of being an innovative organization as shown in Fig. 2. From Fig. 2, the conceptual model presents the existing position of organization A and the strategic gaps between current level of organizational characteristics and benchmarks.

TABLE 4: THE LEVEL AND KPIS UNDER THE HUMAN RESOURCE DEVELOPMENT CHARACTERISTIC

Level of organizational characteristic under human resource development	KPIs	Description
Routine	- Freedom to choose the training course - Number of training course to organizational employees per year	- The training programs are set by the top management only - The training programs are not provided to the middle and operation level
Basic	- Freedom to choose the training course - Number of training course to organizational employees per year	- The training programs are set to the all levels by top management decision - The training programs are provided to employees 1 program per year
Intermediate	Freedom to choose the training course - Number of training course to organizational employees per year	- Employees can choose the training programs from the internal programs by themselves. - The training programs are provided to employees 2- 3 programs per year
Advance	- Freedom to choose the training course - Number of training course to organizational employees per year	- Employees can choose the training program from internal and external programs by themselves - The training programs are provided to employees higher than 3 programs per year

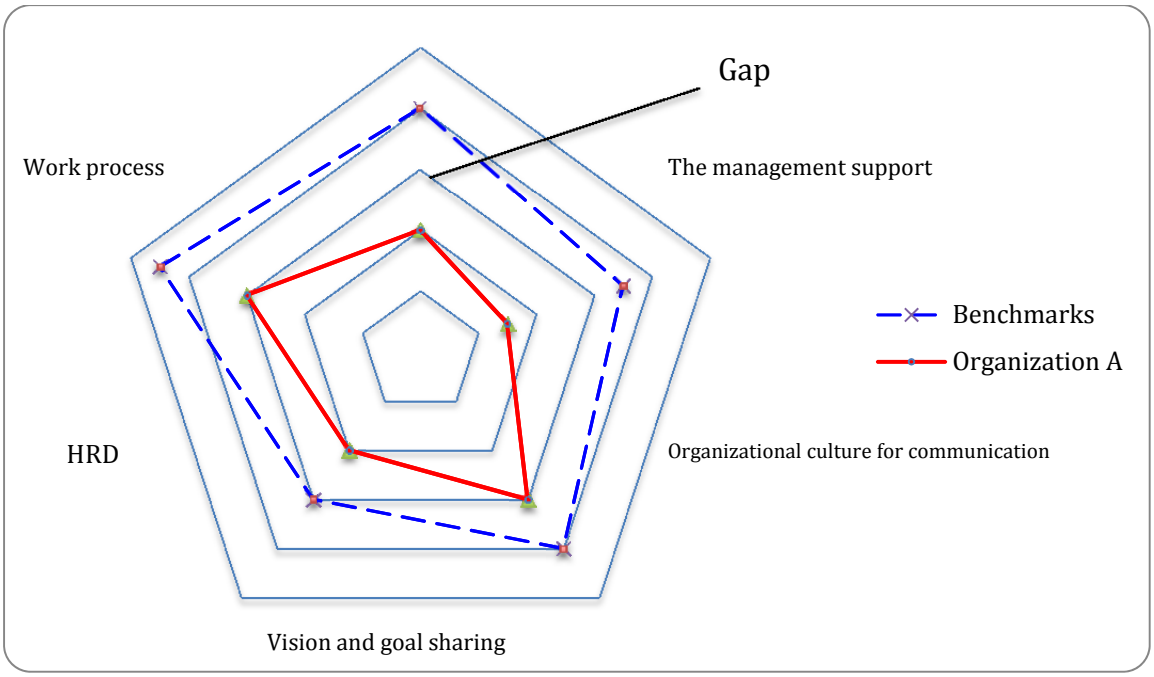

Figure 2: Radar chart with a sample company

V. DISCUSSION

A proposed approach can present the areas needed for improvement so the top management can make the proper strategic decisions to bridge the gaps. The result from a radar chart can also be used to set the strategic direction from different scenarios. With the determination of strategic gaps, some organizations may want to attempt the most challenging tasks first while other organizations may try to make a quick win by focusing on closing smaller gaps. Therefore, the top management can choose an appropriate strategic scenario for the future development.

VI. CONCLUSION

This research is an ongoing project which it ultimately attempts to develop an analytical model to measure the level of organizational characteristics for being an innovative organization along the key dimensions. This paper presents a conceptual approach to evaluate the level of organizational characteristics and also identify the strategic gaps between the current level of organizational characteristics and future requirements for being an innovative organization. With the completion of analytical model development, it can help the management team of any organization to make proper strategic decisions for becoming an innovative organization.

REFERENCES

1. Barney, J.B. and W.S. Hesterly, *Strategic management and competitive advantage: concepts*. 2008: Pearson/Prentice Hall.
2. Taylor, A., K. Wagner, and H. Zablit, *The most innovative companies 2012-"The state of the art in leading industries"*. BCG Perspectives, 2012.
3. Damanpour, F., *Organizational innovation: A meta-analysis of effects of determinants and moderators.* Academy of management Journal, 1991. **34**(3): p. 555-590.
4. Salavou, H., *The concept of innovativeness: should we need to focus?* European Journal of Innovation Management, 2004. **7**(1): p. 33-44.
5. Hitt, M.A., R.E. Hoskisson, and H. Kim, *International diversification: Effects on innovation and firm performance in product-diversified firms.* Academy of management Journal, 1997. **40**(4): p. 767-798.
6. Kanter, R., *When a thousand flowers bloom: Structural, collective, and social conditions for innovation in organizations.* Knowledge Management and Organisational Design, 1996: p. 93-131.
7. NONAKA, I. and H. TAKEUCHI, *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. 1995: Oxford university press.
8. Zollo, M. and S.G. Winter, *Deliberate learning and the evolution of dynamic capabilities.* Organization science, 2002. **13**(3): p. 339-351.
9. Burns, T. and G.M. Stalker, *The management of innovation.* University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship, 1961.
10. Mintzberg, H., *The structuring of organizations.* Englewood Cliffs, 1979.
11. Tidd, J. and J. Bessant, *Managing innovation: integrating technological, market and organizational change*. 4th ed. 2009: John Wiley & Sons, Ltd.
12. De Brentani, U. and E.J. Kleinschmidt, *Corporate culture and commitment: impact on performance of international new product development programs.* Journal of Product Innovation Management, 2004. **21**(5): p. 309-333.
13. Assink, M., *Inhibitors of disruptive innovation capability: a conceptual model.* European Journal of Innovation Management, 2006. **9**(2): p. 215-233.
14. Martins, E. and F. Terblanche, *Building organisational culture that stimulates creativity and innovation.* European Journal of Innovation Management, 2003. **6**(1): p. 64-74.

15. Armstrong, A. and P. Foley, *Foundations for a learning organization: organization learning mechanisms.* Learning Organization, The, 2003. **10**(2): p. 74-82.
16. Galbraith, J.R., *Designing complex organizations*. 1973: Addison-Wesley Longman Publishing Co., Inc.
17. Stata, R. and P. Almond, *Organizational learning: The key to management innovation.* The training and development sourcebook, 1989. **2**.
18. Ichijo, K. and I. Nonaka, *Knowledge creation and management: New challenges for managers*. 2007: Oxford University Press, USA.
19. Nooteboom, B., *Learning and innovation in organizations and economies*. 2000: Oxford University Press.
20. Aragon-Correa, J.A., V.J. Garcoa-Morales, and E. Cordon-Pozo, *Leadership and organizational learning's role on innovation and performance: lessons from Spain.* Industrial marketing management, 2007. **36**(3): p. 349-359.
21. Elenkov, D.S. and I.M. Manev, *Top management leadership and influence on innovation: The role of sociocultural context.* Journal of management, 2005. **31**(3): p. 381-402.
22. Howell, J.M. and B.J. Avolio, *Transformational leadership, transactional leadership, locus of control, and support for innovation: Key predictors of consolidated-business-unit performance.* Journal of applied psychology, 1993. **78**(6): p. 891.
23. Hackman, J.R., *Leading teams: Setting the stage for great performances*. 2002: Harvard Business Press.
24. Teece, D.J., *Competition, cooperation, and innovation: Organizational arrangements for regimes of rapid technological progress.* Journal of Economic Behavior & Organization, 1992. **18**(1): p. 1-25.
25. Chesbrough, H., *Open innovation: The new imperative for creating and profiting from technology*. 2003: Harvard Business Press.
26. Belderbos, R., M. Carree, and B. Lokshin, *Cooperative R&D and firm performance.* Research policy, 2004. **33**(10): p. 1477-1492.
27. Adams, R., J. Bessant, and R. Phelps, *Innovation management measurement: A review.* International Journal of Management Reviews, 2006. **8**(1): p. 21-47.
28. Verhoef, P.C. and P.S. Leeflang, *Understanding the marketing department's influence within the firm.* Journal of Marketing, 2009. **73**(2): p. 14-37.
29. Hagedoorn, J. and M. Cloodt, *Measuring innovative performance: is there an advantage in using multiple indicators?* Research policy, 2003. **32**(8): p. 1365-1379.
30. Subramanian, A. and S. Nilakanta, *Organizational innovativeness: exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance.* Omega, 1996. **24**(6): p. 631-647.
31. Cooper, R.G. and E.J. Kleinschmidt, *WINNING BUSINESSES IN PRODUCT DEVELOPMENT: THE CRITICAL SUCCESS FACTORS.* Research Technology Management, 2007. **50**(3).
32. Van den Bulte, C., *New product diffusion acceleration: Measurement and analysis.* Marketing Science, 2000. **19**(4): p. 366-380.
33. Griffith, R., et al., *Innovation and productivity across four European countries.* Oxford Review of Economic Policy, 2006. **22**(4): p. 483-498.
34. Mote, J., G. Jordan, and J. Hage, *Measuring radical innovation in real time.* International Journal of Technology, Policy and Management, 2007. **7**(4): p. 355-377.
35. Rothaermel, F.T. and A.M. Hess, *Building dynamic capabilities: Innovation driven by individual-, firm-, and network-level effects.* Organization science, 2007. **18**(6): p. 898-921.
36. Morris, L. and L. InnovationLabs, *Innovation metrics*. 2008, An InnovationLabs White Paper.
37. Huang, E.Y. and S.-C. Lin, *How R&D management practice affects innovation performance: an investigation of the high-tech industry in Taiwan.* Industrial Management & Data Systems, 2006. **106**(7): p. 966-996.
38. Cavalluzzo, K.S. and C.D. Ittner, *Implementing performance measurement innovations: evidence from government.* Accounting, Organizations and Society, 2004. **29**(3): p. 243-267.
39. Cameron, K.S. and R.E. Quinn, *Diagnosing and changing organizational culture: Based on the competing values framework*. 2011: John Wiley & Sons.
40. Vega-Jurado, J., et al., *The effect of external and internal factors on firms- product innovation.* Research policy, 2008. **37**(4): p. 616-632.
41. Hall, L.A. and S. Bagchi-Sen, *A study of R&D, innovation, and business performance in the Canadian biotechnology industry.* Technovation, 2002. **22**(4): p. 231-244.
42. Phan, K., *Innovation Measurement: A Decision Framework to Determine Innovativeness of a Company.* 2013., unpublished.
43. Rogers, M., *The definition and measurement of innovation*. 1998: Citeseer.
44. Lanjouw, J.O. and M. Schankerman, *The quality of ideas: measuring innovation with multiple indicators*. 1999, National Bureau of Economic Research.
45. Shapiro, A.R., *Measuring innovation: beyond revenue from new products.* Research-Technology Management, 2006. **49**(6): p. 42-51.
46. Chutivongse, N. and N. Gerdsri. *Key factors influencing the development of innovative organizations: An exploratory study*. in *Technology Management in the Energy Smart World (PICMET), 2011 Proceedings of PICMET'11:*. 2011: IEEE.
47. Damanpour, F. and M. Schneider, *Phases of the adoption of innovation in organizations: Effects of environment, organization and top Managers1.* British Journal of Management, 2006. **17**(3): p. 215-236.
48. Swanson, R.A., *Human resource development: Performance is the key.* Human Resource Development Quarterly, 1995. **6**(2): p. 207-213.
49. Amabile, T.M., *Creativity and innovation in organizations*. Vol. 5. 1996: Harvard Business School Boston.
50. McLean, L.D., *Organizational culture's influence on creativity and innovation: A review of the literature and implications for human resource development.* Advances in Developing Human Resources, 2005. **7**(2): p. 226-246.
51. Aguinis, H. and K. Kraiger, *Benefits of training and development for individuals and teams, organizations, and society.* Annual review of psychology, 2009. **60**: p. 451-474.
52. Rejeb, H.B., et al., *Measuring innovation best practices: Improvement of an innovation index integrating threshold and synergy effects.* Technovation, 2008. **28**(12): p. 838-854.
53. BurgeSmani, R.A. and S.C. Wheelwright, *Strategic management of technology and innovation.* READING, 2004. **1**: p. 1.
54. Figueroa, E. and P. Conceicao, *Rethinking the innovation process in large organizations: a case study of 3M.* Journal of Engineering and technology Management, 2000. **17**(1): p. 93-109.
55. Von Hippel, E., S. Thomke, and M. Sonnack, *Creating breakthroughs at 3M.* Harvard Business Review, 1999. **77**: p. 47-57.
56. Mosley, H. and A. Mayer, *Benchmarking national labour market performance: a radar chart approach*. 1999, Discussion paper//Wissenschaftszentrum Berlin for Sozialforschung, Forschungsschwerpunkt: Arbeitsmarkt und Beschaftigung, Abteilung: Arbeitsmarktpolitik und Beschaftigung.