Assessment of managerial innovation in manufacturing company

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Abstract. Every company has to develop their managerial capability to maximize performance of every function in order to survive in an environment with drastic changes right now. This research was conducted at two governments owned manufacturing companies to compare the differences in managerial innovation. The method to assess the managerial innovation was based on elements of management function, which are planning, organizing, leading, controlling and coordinating. There were two methods in collecting the data, using questionnaire and doing observation. Questionnaires results were calculated using BPMSG AHP online system, to determine the score. The higher score of managerial innovation, the higher potential of the company to innovate. Managerial innovation score were 42.3% and 48.9%, which showed that none of them were innovative based on the previous research standard, which stated that innovation potential should be more than 50%. The differences between the two were also analysed based on every management function.

Keywords: managerial innovation, management functions, manufacturing company

1. Introduction

Innovation is a process of turning ideas into reality and making it capable to create social values. Innovation is the key to success in companies. Innovative companies have greater potential to achieve success when compared to non-innovative companies (1). A Turkish research describes a methodology to assess managerial innovation in manufacturing industries (2). The assessment was based on the evolution of each management functions. Evolution means that five management functions: planning, organizing, leading, controlling, and coordinating, changes in its process. The Research gives weight to every dimension of existing management functions. Biggest weight adjustment is given to newest element of every management function (related to technological and social change).

This research used the methodology to assess two manufacturing companies. The result was analysed to produce a managerial improvement in order to increase innovation. Damanpour & Aravind's (3) concept supported the method by explaining the significant correlation between managerial innovation with innovation management where companies with high managerial innovation level (>50%) have potential to innovate and create values.

The rest of this paper is organized as follows. Section 2 introduces the definition of managerial innovation, comparison between five management functions and its element, and the assessment of

managerial innovation. Section 3 explains the research method. Section 4 presents the managerial innovation results of the two manufacturing companies. Section 5 discussed the comparison and analysis to each management function for both companies. We close with some conclusions and further research suggestions in section 6.

2. Managerial Innovation Assessment

Managerial Innovation is the capability to handle the changes occurring in the management functions, in the most appropriate way (2). Managerial innovation is also the implementation of new organizational structures, administrative systems, management practices, processes, and techniques that could create value for the organization (4). Managerial innovation is measured through the evolution level of management functions (see figure 1). Each evolution level has its own version of management functions (see figure 2). Hence Managerial Innovation can be assessed by observing five management functions (planning, organizing, leading, controlling, and coordinating) at each level of evolution. Each level of evolution have different weight at each functions. It shows that the higher the level of management function, the higher potency of the company to make something innovative. The relative weight of each element in figure 2 can be found in table 1.
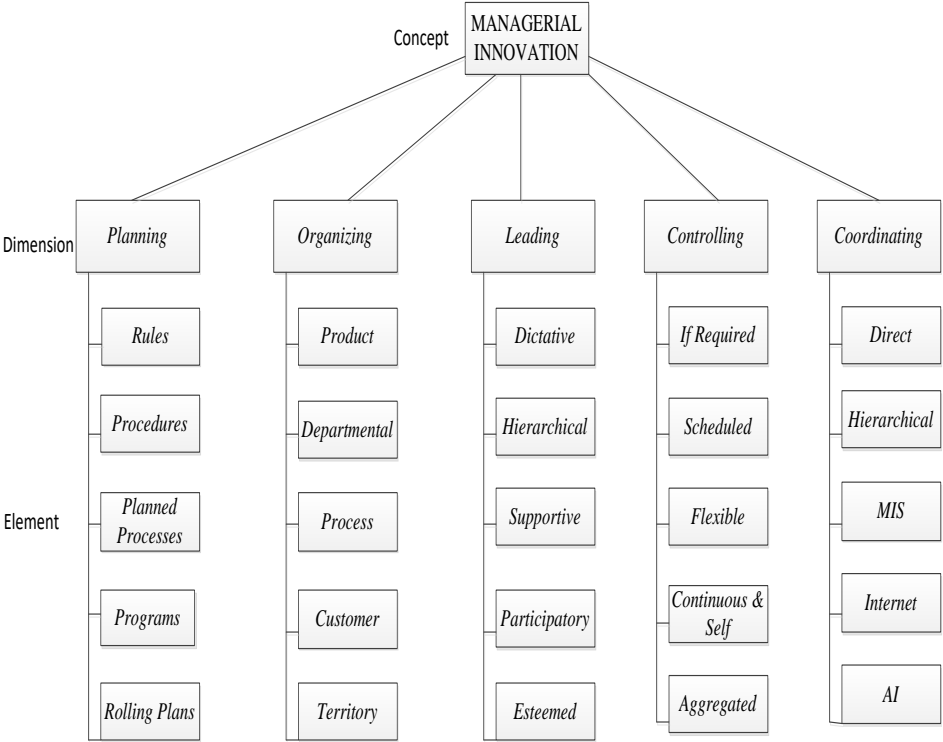

Figure 1. Management evolution.

Figure 2. Element in management function.

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Table 1. Specific Management Functions with Weights.

Manufacturing types	Planning	Organizing	*Leading*	*Controlling*	*Coordinating*	Relative weight
Prescientific Management	Rules	Product	Dictative	If required	Direct	2^0
Departmental Management	Procedure	Department	Hierarchy	Scheduled	Hierarchy	2^1
Process Management	Planned Process	Process	Supportive	Flexible	Management Information System	2^2
Management Objective	Programme	Customer	Participatory	Continuous	Internet	2^3
Virtual Management	Rolling Plans	Territory	Esteemed	Aggregate	Artificial Intelligent	2^4

To measure the managerial innovation level of a company, every observation of management functions should be put into the equations below.

$$Pf = \frac{weight\ rule\ x\ \% +\ procedure\ x\ \% + program\ x\ \% + processes\ x\ \% + rolling\ plan\ x\ \%}{Total\ weight\ of\ planning\ function} \quad (1)$$

$$Of = \frac{weight\ product\ x\ \% +\ department\ x\ \% +\ process\ x\ \% + customer\ x\ \% + territory\ x\ \%}{Total\ weight\ of\ organizing\ function} \quad (2)$$

$$Lf = \frac{weight\ dictative\ x\ \% +\ structural\ x\ \% +\ supportive\ x\ \% + participant\ x\ \% + esteem\ x\ \%}{Total\ weight\ of\ leading\ function} \quad (3)$$

$$Cf = \frac{weight\ dictative\ x\ \% + if\ required\ x\ \% +\ scheduled\ x\ \% +\ flexible\ x\ \% + cont\ x\ \% + aggr\ x\ \%}{Total\ weight\ of\ controlling\ function} \quad (4)$$

$$Coorf = \frac{weight\ direct\ x\ \% + hierarchical\ x\ \% +\ scheduled\ x\ \% +\ MIS\ x\ \% + internet\ x\ \% + AI\ x\ \%}{Total\ weight\ of\ coordinating\ function} \quad (5)$$

The managerial innovation percentage can be determined using equation:

$$\delta MI : \frac{(Wp.Pf) + (Wo.Of) + (Wl.Lf) + (Wc.Cf) + (WCoor.Coorf)}{Wp + Wo + Wl + Wc + Wcoor} \quad (6)$$

δMI	: Degree of Managerial Innovation	PF	: Innovation in Planning Function
Wp	: Weight of Planning Function	OF	: Innovation in Organizing Function
Wo	: Weight of Organizing Function	LF	: Innovation in Leading Function
Wl	: Weight of Leading Function	CF	: Innovation in Controlling Function
Wc	: Weight of Controlling Function	Coorf	: Innovation in Coordinating Function
Wcoor	: Weight of Coordinating Function		

3. Research Method

There are two main activities in collecting data, both were about measuring the level of management functions activities, namely observation and experts feedback using questionnaires. The level of innovations PF, OF, LF, CF and Coorf were obtained by performing a survey and observing these functions with Head Division, Head Department, and Head Sub-Department. The weights Wp, Wo, Wl, Wc, and Wcoor are obtained through the questionnaire sent to industrial expert.

We used BPMSG AHP Online system to process the questionnaires. By using this online system, the repetition and replication for future researches will be easier. It also has validation system so if the calculations are not consistent, the system would not give the weight.

With these results, the degree of managerial innovation was determined using equation 6. If the result of managerial innovation less is than 50%, it means that the management is not innovative enough to produce innovations.

4. Result

The results of observations are presented in table 2 to 6 below.

Table 2. The result of observation in Planning PT X and PT Y.

Element	Planning PT. X	Planning PT.Y
Rules	96%	99%
Procedure	97%	98%
Planned Process	86%	87%
Programs	96%	93%
Rolling Plans	93%	89%

Table 3. The result of observation in Organizing PT X and PT Y.

Element	Organizing PT. X	Organizing PT.Y
Product	100%	100%
Departmental	100%	100%
Process	0%	100%
Customer	0%	0%
Territory	0%	0%

Table 4. The result of observation in Leading PT X and PT Y.

Element	Leading PT. X	Leading PT.Y
Dictative	95%	100%
Structural	92%	99%
Supportive	25%	93%
Participant	6%	39%
Esteem	0%	0%

Table 5. The result of observation in Coordinating PT X and PT Y.

Element	Coordinating PT. X	Coordinating PT.Y
Direct	99%	99%
Hierarchical	100%	100%
MIS	97%	94%
Internet	98%	100%
AI	0%	8%

Table 6. The result of observation in Controlling PT X and PT Y.

Element	Controlling PT. X	Controlling PT.Y
If required	94%	93%
Scheduled	99%	99%
Flexible	89%	96%
Continuous	96%	63%
Aggregate	2%	17%

The values of each management functions levels can be obtained using equations 1-5. The scores for PT. X:

$$PF = \frac{(1 \times 96\% + 2 \times 97\% + 4 \times 86\% + 8 \times 96\% + 16 \times 93\%)}{31} \times 100\% = 93.23\%$$

$$OF = \frac{(1 \times 100\% + 2 \times 100\%)}{31} \times 100\% = 9.68\%$$

$$LF = \frac{(1 \times 95\% + 2 \times 92\% + 4 \times 25\% + 8 \times 6\%)}{31} \times 100\% = 13.77\%$$

$$CF = \frac{(1 \times 94\% + 2 \times 99\% + 4 \times 89\% + 8 \times 96\% + 16 \times 2\%)}{31} \times 100\% = 46.71\%$$

$$CoorF = \frac{(1 \times 99\% + 2 \times 100\% + 4 \times 97\% + 8 \times 98\%)}{31} \times 100\% = 47.45\%$$

The scores for PT Y:

$$PF = \frac{(1 \times 99\% + 2 \times 98\% + 4 \times 87\% + 8 \times 93\% + 16 \times 89\%)}{31} \times 100\% = 90.68\%$$

$$OF = \frac{(1 \times 100\% + 2 \times 100\% + 4 \times 100\%)}{31} \times 100\% = 90.68\%$$

$$LF = \frac{(1 \times 100\% + 2 \times 99\% + 4 \times 93\% + 8 \times 39\%)}{31} \times 100\% = 31.68\%$$

$$CF = \frac{(1 \times 93\% + 2 \times 99\% + 4 \times 96\% + 8 \times 63\% + 16 \times 17\%)}{31} \times 100\% = 46.81\%$$

$$CoorF = \frac{(1 \times 99\% + 2 \times 100\% + 4 \times 94\% + 8 \times 100\% + 16 \times 8\%)}{31} \times 100\% = 51.71\%$$

The result of questionnaire were used to determine the degree of managerial innovation. The questionnaire sent to 30 industrial expert from PT. X and 30 industrial expert from PT. Y and were calculated by BPMSG AHP Online system. The validity of values was good because the consistency ratio is 4%, which is below 10% (5). The value of Planning is 20.6%, Organizing is 19.1%, Leading is 21.5%, Coordinating is19.3% and Controlling is19.5%.

By calculating, every element above the score of the degree of managerial innovation in PT X and PT. Y is presented in table 7 below.

Table 7. The result of degree of managerial innovation in PT. X.

Management Functions	Capabilities PT. X	Weight PT. X
Planning	93.23%	20.60%
Organizing	9.68%	19.10%
Leading	13.77%	21.50%
Coordinating	46.71%	19.30%
Controlling	46.75%	19.50%
Degree of Managerial Innovation	42.3%	

$$\delta MI = \frac{(Wp \times Pf) + (Wo \times Of) + (Wl \times Lf) + (Wc \times CF) + (WCoor \times Coorf)}{(Wp + Wo + Wl + Wc + WCoor)} \times 100\% = 42.3\%$$

Table 8. The result of degree of managerial innovation in PT. Y.

Management Functions	Capabilities PT. Y	Weight PT. Y
Planning	90.68%	20.60%
Organizing	22.58%	19.10%
Leading	31.68%	21.50%
Coordinating	46.81%	19.30%
Controlling	51.71%	19.50%
Degree of Managerial Innovation	48.9%	

$$\delta MI = \frac{(Wp \times Pf) + (Wo \times Of) + (Wl \times Lf) + (Wc \times CF) + (WCoor \times Coorf)}{(Wp + Wo + Wl + Wc + WCoor)} \times 100\% = 48.9\%$$

5. Discussion

PT. X business is in electronics for industry, covering train transportation, information technology and communication. PT Y business is in manufacture machineries and weapon system. Both are government owned companies, located in Bandung, West Java, Indonesia. In Planning function, PT X obtained 93.23% and PT Y obtained 90.68%. The differences is in element namely program, planned processes, and rolling plans. The score of PT Y is smaller than PT X because PT Y did not plan as they roll although there are some changes about technology and social outside the company. In Organizing function, PT X obtained 9.68% and PT Y obtained 22.58%. The score of PT Y is bigger than PT X because PT Y had 3 model of organization structure. In Leading function, PT X obtained 13.77% and PT Y obtained 31.68%. PT Y has element namely participant. When there is production system, leader involved not complete but gave intention about what must to do for their manager. In controlling function, PT X obtained 47.75% and PT. Y obtained 51.71%. PT. X focuses for controlling with element continuous & self and PT Y focuses with using ERP. In Coordinating function, PT. X obtained 46.71% and PT. Y obtained 46.81%. There is no differences between the element in Coordinating functions.

6. Conclusion and Further Research

The assessment method has been successfully implemented in Indonesian manufacturing companies. The score of managerial innovation of PT. X is 42.3% and PT. Y is 48.9%. Hence, both companies

should improve their management functions to improve capability in innovations. For further research, the model can also be applied in different sectors with some modifications, especially in the weight of the management functions.

7. References

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