

Evaluation of World Class Manufacturing Performance of Meat Products Industry of Iran: An Empirical Evidence from Kalleh Meat Products Company

Hasanali Aghajani¹, Ali Mirzaei Baboli¹, Zeinab Elyasi¹, Zeinolabedin Akbarzade¹, Maedeh Sedaghat²

¹Department of Industrial Management, University of Mazandaran, Babolsar, Mazandaran, Iran

²Department of business Management, University of Payam Noor, Babol, Mazandaran, Iran

aghajani@umz.ac.ir

Abstract- There is no doubt that world class manufacturing offers a vast variety of economic development opportunities and plays a vital role in rapid economic changes, productivity improvement and international competitiveness enhancement for developing of countries. In this paper, primary data are collected via structured interviews with Kalleh specialists using the standard questionnaire developed by Shingo. Data analysis shows that according to five areas of Shingo's model, Kalleh is placed as a world class manufacturer only in result areas, i.e. quality, cost and delivery, and profitability and customer satisfaction. Kalleh hasn't gained the minimum required points in leadership and empowerment, system integration and manufacturing strategy, and non-manufacturing support functions. Overall, Kalleh hasn't obtained enough scores to be considered as a world class manufacturer. To become a world class manufacturer, Kalleh needs to focus more on improving its performance in leadership and empowerment, system integration and manufacturing strategy, and non-manufacturing support functions.

Keywords- Evaluation - world class manufacturing - Meat Products Industry - Shingo's model

I. INTRODUCTION

World class manufacturing offers a vast variety of economic development opportunities and plays a vital role in rapid economic changes, productivity improvement and international competitiveness enhancement for developing of countries [6]. In these days, the necessity of globalization is getting more important especially in manufacturing section. Many models have been presented for evaluating world class manufacturing, but in this study, we employ Shingo's model. Based on Shingo's model, in this study world class manufacturing have been evaluated in 5 categories that are leadership and empowerment, result areas, system integration and manufacturing strategy, non-manufacturing support functions and profitability and customer satisfaction.

II. LITERATURE REVIEW AND HYPOTHESES

A. World Class Manufacturing

Reviewing the literature shows that WCM is a general and wide concept. In one approach, WCM is a production management philosophy that pays special attention to continuous improvement, production techniques and human resource [5]. The common factor among the approaches is having a high performance organization.

In Hopper et al. article (2008), the influence of executing WCM in seven factories had been investigated. The results suggest that three responsibilities (financial, manufacturing and customer desirability) are connected to each other by representatives such as consultants, academic institutes and colleges, human resource unions and semi governmental organizations.

Sangwan and Digalwar (2008) recognized and validated 73 performance variables for evaluating WCM systems and categorized them in 12 critical factors using nominal group technique, and then compared the degree of production system success at world level in three car companies in India using performance value analysis.

Main hypothesis: Kalleh meat Product Company is at world class manufacturing level based on Shingo's model.

B. Leadership Culture and Substructure

Supporting management team at high level is one of the most important factors that bring about the integration of traditional system with WCM executing plans [1, 13]. Scodanibbio (2006) and Haung (1991) believe that employee participation in organization affairs is one of the necessary methods for becoming a world class manufacturer. Ross (1991) emphasizes on the necessity of organization reconstructing, elimination of departmental competitiveness and task participation in the issue of culture and structure.

The first secondary hypothesis: Kalleh is at world class level according to leadership culture and substructure.

C. System Integration and Construction Strategies

Ross (1991) and Giffi et al. (1990), believe that improvement in various fields is necessary for becoming world class manufacturer and choosing the correct strategy and organization performance measurement are the two most important ones. The fundamental constructing strategies are low cost, faster delivery and higher quality and flexibility. One of the most important issues relating to strategy is creating suitability among trade establishment strategies in order to gaining production goals^[2].

The second secondary hypothesis: Kalleh is at world class level according to system integration and construction strategies.

D. Non-Manufacturing Support Functions

Non-manufacturing support functions can be included accounting, human resource, sale and marketing, primary materials, buying, quality, management information systems, etc. In this part of Shingo's model, the degree of integration among manufacturing units and other non-manufacturing units are first studied and then the effect of employed strategies and techniques on value stream is assigned. Eid (2009) mentions the continuous improvement as WCM strategic empowerments. Some writers^[16, 15] emphasize on the necessity of non-manufacturing support functions for obtaining world class performance.

The third secondary hypothesis: Kalleh is at world class level based on non-manufacturing support functions.

E. Cost Quality and Productivity

This part of Shingo's model is for evaluating the output of business main systems or is designed for the techniques' performance at world class. In terms of suitable training of quality section, it has the vital role in executing WCM^[7, 12]. Total quality management, total productivity maintenance, lean production and total service management are the

incidental tools for becoming a world class manufacturer^[10, 11, 14, 17].

The forth secondary hypothesis: Kalleh is at world class level based on cost quality and productivity.

F. Profitability and Customer Satisfaction

The aim of each manufacturing company is creating stabilized profit. World class manufacturer refers to a company's capability in being successful in competition and being profitable^[3]. In Shingo's model, the purposes of studying profitability and customer satisfaction are evaluating the qualitative output, cost, delivery and satisfying customer needs and business results.

The fifth secondary hypothesis: Kalleh is at world class level based on profitability and customer satisfaction.

III. METHODOLOGY

A. Sample

12 experts of Kalleh have formed the sample of the present study. The experts must have at least Bachelor degree and 10 year experience and are fully aware of WCM concepts and production factors.

B. Measurement Scales

The present study's measurement tool is Shingo's model standard questionnaire. This model has 1000 scores which are divided into 5 general categories that are leadership and empowerment, result areas, system integration and manufacturing strategy, non-manufacturing support functions and profitability and customer satisfaction. The least score for achieving bronze reward is 700.

The main data of the research are gathered through survey method and interview.

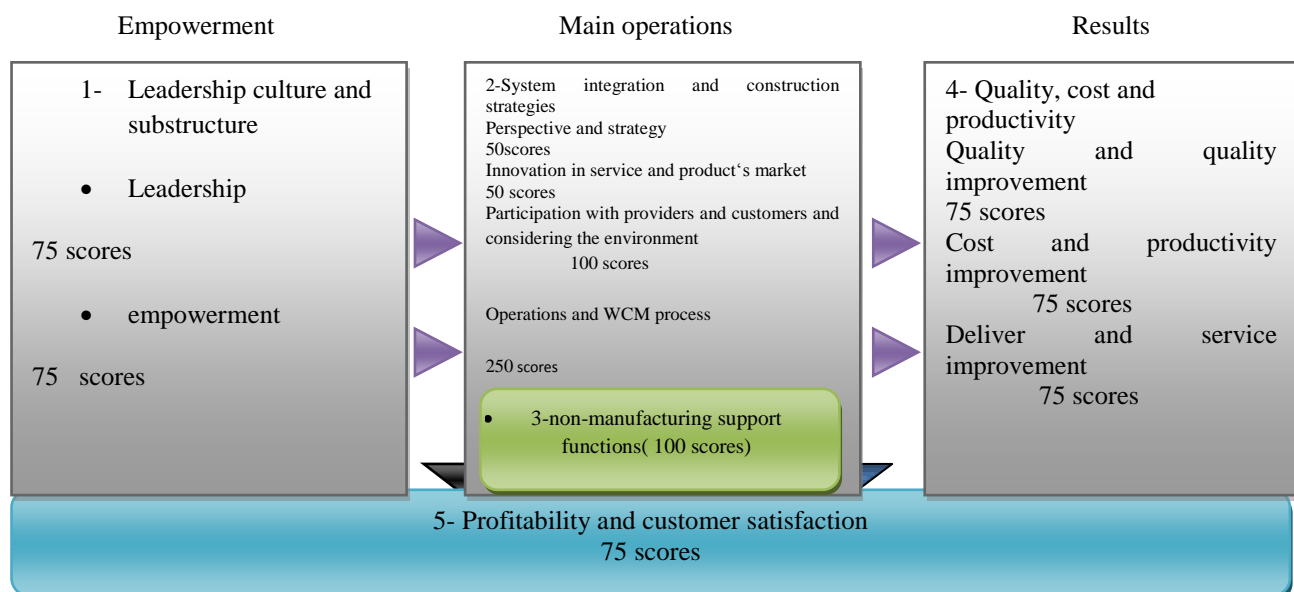


Figure 1 Shingo's model

The related questionnaire is valid. The reliability of the questionnaire is measured using Cronbach alpha. The measured total reliability coefficient is 89%. The reliability coefficients of the other factors are listed in Table 1.

Table I Each factor's Cronbach alpha coefficient

	Factor	Alpha coefficient
1	Leadership	85%
2	Empowerment	88%
3	Innovation in production designing ,development and customer service	93%
4	Participation with customers and providers	95%
5	Process and WCM operations	89%
6	Strategy	92%
7	Non-manufacturing support functions	87%
8	Quality improvement	83%
9	Cost and productivity improvement	91%
10	Delivery and service improvement	91%
11	Profitability and customer satisfaction	91%

C. Analyzing Method

Based on Shingo's model, each factor's score is equally divided among sub factors, so each sub factor's score can be assigned. Then the company's experts allocate a score between 20 to 100 per cents depending on the condition of the company and via comparing the company with an ideal company. The extremely desired situation equals 100%, desired equals 80%, average equals 60%, weak equals 40% and poorly weak equals 20% which are each sub factor's score. The final score of each sub factor is calculated by multiplying these sub factors' scores by the average of expert's allocated percent to each sub factor. Factors' score is calculated by the sum of gathered scores of each sub factor and the company's final score is calculated through the sum of each factors.

IV. FINDINGS

A. Calculating the Scores

The scores related to the evaluation of WCM according to Shingo's model and based on the experts' opinions are presented below.

Leadership section consists of 7 sub factors and according to the experts' idea, the company is at world class level in all sub factors except the second one. In total, Kalleh is at world class level in leadership.

The total score of the leadership section: $0.76(75/7) + 0.68(75/7) + 0.71(75/7) + 0.71(75/7) + 0.7(75/7) + 0.7(75/7) + 0.76(75/7) = 53.7$

Empowerment consists of 12 sub factors. Based on the experts' idea, the company is at world class level just in the 8th sub factor, and the company couldn't gain the required score in others, so Kalleh isn't at world class level in empowerment.

The total score of the empowerment section: $0.58(75/12) + 0.51(75/12) + 0.6(75/12) + 0.68(75/12) + 0.62(75/12) + 0.65(75/12) + 0.52(75/12) + 0.78(75/12) + 0.63(75/12) + 0.68(75/12) + 0.58(75/12) + 0.62(75/12) = 46.5$

Innovation section includes 9 sub factors. Based on the experts' idea, the company is at world class level in the 3rd, 4th and 5th sub factors. In total, Kalleh isn't at world class level in innovation.

The total score of the innovation section: $0.58(50/9) + 0.65(50/9) + 0.75(50/9) + 0.78(50/9) + 0.77(50/9) + 0.66(50/9) + 0.68(50/9) + 0.66(50/9) + 0.63(50/9) = 25.6$

The provider and customer participation section consists of 7 sub factors. Based on the experts' idea, the company is at world class level in 1st, 3rd, 5th and 7th sub factors. In total, Kalleh isn't at world class level in this factor.

The total score of the participation section: $0.71(100/7) + 0.65(100/7) + 0.7(100/7) + 0.68(100/7) + 0.76(100/7) + 0.6(100/7) + 0.75(100/7) = 69.4$

The processes and world class manufacturing function consists of 22 sub factors.

Based on the experts' idea, the company is at world class level just in the 1st, 6th and 7th sub factors, so Kalleh isn't at world class level in this factor.

The total score of the process section: $0.71(250/22) + 0.63(250/22) + 0.61(250/22) + 0.61(250/22) + 0.63(250/22) + 0.71(250/22) + 0.71(250/22) + 0.53(250/22) + 0.53(250/22) + 0.52(250/22) + 0.6(250/22) + 0.53(250/22) + 0.61(250/22) + 0.6(250/22) + 0.58(250/22) + 0.55(250/22) + 0.55(250/22) + 0.63(250/22) + 0.63(250/22) + 0.6(250/22) + 0.58(250/22) = 173.8$

Strategy section consists of 3 sub factors. Based on the experts' idea, the company isn't at world class level in any sub factors, so Kalleh isn't at world class level in this factor.

The total score of the strategy section: $0.63(50/3) + 0.6(50/3) + 0.58(50/3) = 30.1$

The non-manufacturing support function consists of 5 sub factors. Based on the experts' idea, the company is at world class level in just three sub factors, so Kalleh isn't at world class level in this factor.

The total score of the non-manufacturing support function section: $0.7 (100/5) + 0.71(100/5) + 0.7 (100/5)+ 0.6(100/5)+ 0.66(100/5)= 67.4$

The quality improvement consists of 5 sub factors. Based on the experts' idea, the company is at world class level in 4 sub factors, so Kalleh is at world class level in this factor.

The total score of the quality improvement section: $0.73(75/5) + 0.75(75/5) + 0.77(75/5) + 0.7(75/5)+ 0.67(75/5) = 54.3$

The cost and productivity improvement consists of 10 sub factors. Based on the experts' idea, the company is at world class level in 7 sub factors, so Kalleh is at world class level in this factor.

The total score of the cost and productivity improvement section: $0.83(75/10) + 0.8 (75/10) + 0.75(75/10) + 0.71(75/10)+ 0.6(75/10)+ 0.6(75/10)+ 0.71(75/10)+ 0.7(75/10)+ 0.7(75/10)+ 0.61(75/10)= 52.57$

The delivery and service improvement consists of 3 sub factors. Based on the experts' idea, the company is at world class level in all 3 sub factors, so Kalleh is at world class level in this factor.

The total score of delivery and service improvement section: $0.81(75/3) + 0.78(75/3) + 0.8 (75/3) = 59.75$

The profitability and customer satisfaction consists of 10 sub factors. Based on the experts' idea, the company is at world class level in 6 sub factors. According to gathered scores, Kalleh has been able to acquire the required scores to be placed at world class level in this factor.

The total score of the profitability and customer satisfaction section:

$0.74(75/10)+ 0.75(75/10)+ 0.66(75/10)+ 0.65(75/10)+ 0.66(75/10)+ 0.76(75/10)+ 0.71(75/10)+ 0.65(75/10)+ 0.75(75/10)+ 0.72(75/10)= 52.875$

The acquired results are illustrated in Figure 2. In Figure 3, the analysis of the gap among the desired, goal and the current situation is shown.

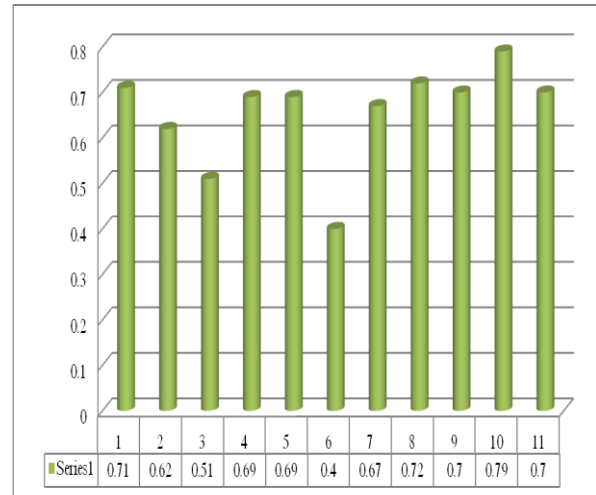


Figure 2 The percentage of total factors' scores

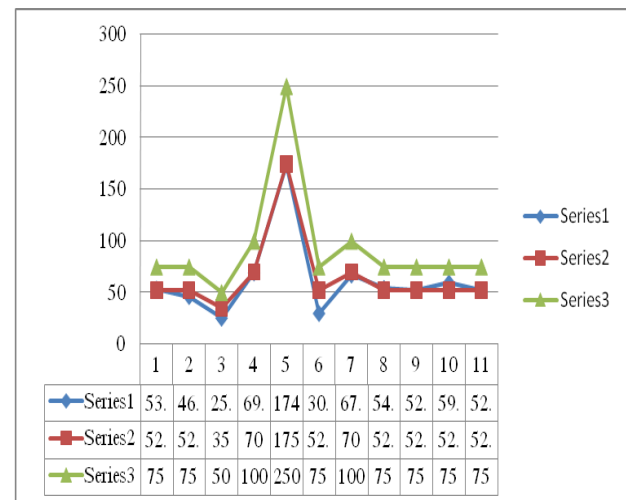


Figure 3 Comparison among the desired, goal and the current situation

B. Hypothesis Test

For leadership culture and substructure hypotheses, by summing the scores of leadership culture and substructure factors, the below results are obtained:

$$53.7+46.5=100.2$$

Since the score of leadership culture and substructure is 150 and the studied company has obtained 100.2, so it hasn't been able to acquire the required score (70%). Hence the first hypothesis is rejected. Kalleh isn't at world class level according to leadership culture and substructure.

On the second hypothesis that is related to system integration and construction strategies, the company hasn't acquired the required score.

$$25.6+69.4+173.8+30.1=299$$

Hence the second hypothesis is rejected. Kalleh isn't at world class level according to integration and construction strategies.

On the third hypothesis that is related to non-manufacturing support functions, the company has obtained 67.4% of the scores and can't be placed at world class level so the third hypothesis is rejected too.

The company has acquired the required score in quality, cost and delivery section, so it can be placed at world class level.

$$54.3+52.57+59.75=166.6$$

The last hypothesis is related to profitability and customer satisfaction. The company has gained 70% of the scores so it is placed at world class level.

The general hypothesis is related to being at world class level. All the scores of the 5 mentioned sections are added in order to obtaining the final score:

$$100.2+299+67.4+166.6+52.8=686.8$$

So as it can be seen, Kalleh hasn't been able to obtain 700 scores (the 70% of 1000 score of Shingo's model) despite its proximity, so Kalleh isn't at world class level.

V. CONCLUSION

As it is illustrated in Figure 3, Kalleh is at world class level in leadership (Factor 1), quality improvement (Factor 8), cost and productivity improvement (Factor 9), delivery and service improvement (Factor 10) and profitability and customer satisfaction (Factor 11). Kalleh isn't at world class level in other factors.

Overall, Kalleh has been able to be placed at world class level just in result areas (based on quality, cost and delivery) and profitability and customer satisfaction based on Shingo's model. In short, the company should try to improve the dimensions that are below the least required score, in order to being able to compete with the superiors of meat product industry.

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