Asesorías y Tutorías para la Investigación Científica en la Educación Puig-Salabarría S.C.
José María Pino Suárez 460-2 esq a Lerdo de Tejada. Toluca, Estado de México. 7223898475
RFC: ATI120618V12

Revista Dilemas Contemporáneos: Educación, Política y Valores.
http://www.dilemascontemporaneoseducacionpoliticayvalores.com/
Año: VI Número: Edición Especial Artículo no.:31 Período: Julio, 2019.

TÍTULO: Producción dinámica en una clase mundial con estructura nativa.

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RESUMEN: En vista del inevitable proceso de globalización de la producción y la industria, nuestros productores deben reformar sus formas tradicionales, ineficientes e ineficaces del pasado y adoptar un nuevo enfoque de políticas de producción centradas en la tecnología, la orientación al cliente y la eliminación de actividades que no agregan valor, En este estudio, los factores que afectan la producción de clase mundial se pueden identificar mediante el método Delphi. Los método de recolección de datos fueron de información bibliográfica y el studio de campo. En esta investigación se presentan y analizan la historia y varios modelos diseñados en el campo de producción de clase global. En esta investigación, expertos de la industria y profesores universitarios han recibido asistencia.

PALABRAS CLAVES: clase mundial, modelo de producción, fabricación de clase mundial, método Delphi, industria.

TITLE: Dynamic production in a world class with native structure.

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ABSTRACT: In view of the unavoidable process of globalization of production and industry, our producers, in turn, have inevitably to reform their traditional, inefficient, and ineffective ways of past and adopt a new approach to production policies. Policies focusing on technology, customer orientation and elimination of activities that do not add value. In this study, factors affecting world-class production can be identified using the Delphi method. Data collection method, in addition to the library method is also field. In this research, history and various models designed in the field of production in the global class are presented and analyzed. In this research, experts from the Iranian gang industry and university professors have been assisted.

KEY WORDS: world class, production model, world class manufacturing, Fuzzy Delphi, Industry

INTRODUCTION.

Today, with the globalization of the economy, the paradigms governing organizations have undergone many changes, which its natural result is the competition from national and international markets to international markets (Alam Tabriz, 2014).

World class manufacturing which means continuous improvement in the key resources of the organization caused a fundamental transformation in the arena of world business and manufacturing, with its two main axes is the global attitude toward the market and its relationship with customers and the development of goods and services globally. Hence, the conceptual design of contingency

models with flexibility and environmental adaptation for organizations and companies has become an inevitable necessity for achieving excellence (Jafari Eskandari, 2014).

Production in the world class manufacturing is a level of organizational performance that can compete in the global arena and can provide an appropriate response to the today's need of business world (Farsijani, 2010).

Entering world markets is also one of the important issues in our country, which has attracted the attention of many industrial managers. With the advent of international organizations and regional memoranda, trade has extended in the global arena and commodities manufacturing countries have crossed the political and national borders and give to consumers that it may culturally and racially not have any competition with the producers of that commodity (Farsijani, 2013).

DEVELOPMENT.

A review of research literature.

Production management has evolved over different periods and become world class manufacturing from manual and traditional production in the national dimension.

Two important and influential revolutions took place on the evolution of production, at the beginning and end of the twentieth century (Aghajani, 2013). Dynamical system in mathematics and solving industrial-social and managerial issues is called to systems that their state is changed with time (ford, 2009).

Baroncell believes that the core components of world class competition mean that organizations in the global market are successful in any competition; that is, in terms of quality, waiting time, flexibility, cost and price, customer service and innovation to be better than any competitor or be equal to him (Baroncell, C. & Ballerio, N, 2016).

Table1: Characteristics of World Class Manufacturers.

Researcher	Characteristics
Wisner& Fawcett	Attention simultaneously to quality and productivity, having a systematic and integrated approach based on competition, emphasis on training and development of human resources, continuous improvement in product and process, simultaneous attention to all aspects of competition and long-term attitude (Farsijani, 2015).
Safaei Ghadikalaei	Strengthening the workforce, improving relationships with suppliers, compatible design of product with the process, simplifying work, improving quality, timely production controls, performance measurement, continuous modeling and improvement, proper utilization from capacity and emphasis on customer (Safaei Ghadikalaei, 2012).
Safaei Ghadikalaei and Dargahi	Inclusive quality management, Implementation of Employees' participation program, Timely production, Comprehensive productive maintenance, Continuous improvement, Choice of suppliers and appropriate technology (Safaei Ghadikalaei and Dargahi, 2012).
Farsijani	Electronic presence on the global arena, new social responsibility, dynamic integration of supply chain network, virtual organizational structure, modern technology, employee precedence, continuous improvement through continuous learning, team-based organizational structure, responsibility to environment and ecology, partnership with customers, a clear vision, a system for identifying positive outcomes and rewarding them, a culture of universal quality, and efficient processes (Farsijani, 2017).

Andreas Gröbler in 2005 states the role of strategy and production capability as follows: In terms of production management, strategic capability has a major contribution in the success factors of companies in competition, i.e, the strength of a factory is the support of the strategy of the firm and help to improve and succeed in the market.

Developing and transferring strategic capabilities is an important task of the production strategy. This task is often in conflict with solving everyday problems and strict activities of management of operations. One of the most prominent authors in this field has proposed four strategic capabilities in operations and production: Ability to produce 1: with less cost 2: with high quality 3: confident delivery 4: with flexiblity in combination and number of products (Bentes, 2011).

Production models in the world class.

Farsijani (2014) suggests the following three phases in the organizational development model to facilitate the movement of Iranian organizations to become a world class manufacturer, and in each phase, a series of basic features of world class organizations is considered and try to create them in a traditional organization.

First Phase: 1. Perspective, 2. Inclusive quality culture, 3. Efficient processes, and 4. Modern technology.

Second Phase: 5. Dynamic integration of the supply chain network, 6. Staff priority and comprehensive quality management, 7. Continuous improvement through continuous learning, team-based organizational structure, 8. Partnership with customers, 9. System of identifying positive results and 10. Rewarding them.

Third Phase: 11. Electronic presence in the global arena, 12. New social responsibility, 13. Virtual organizational structure, 14. Responsibility to the environment.

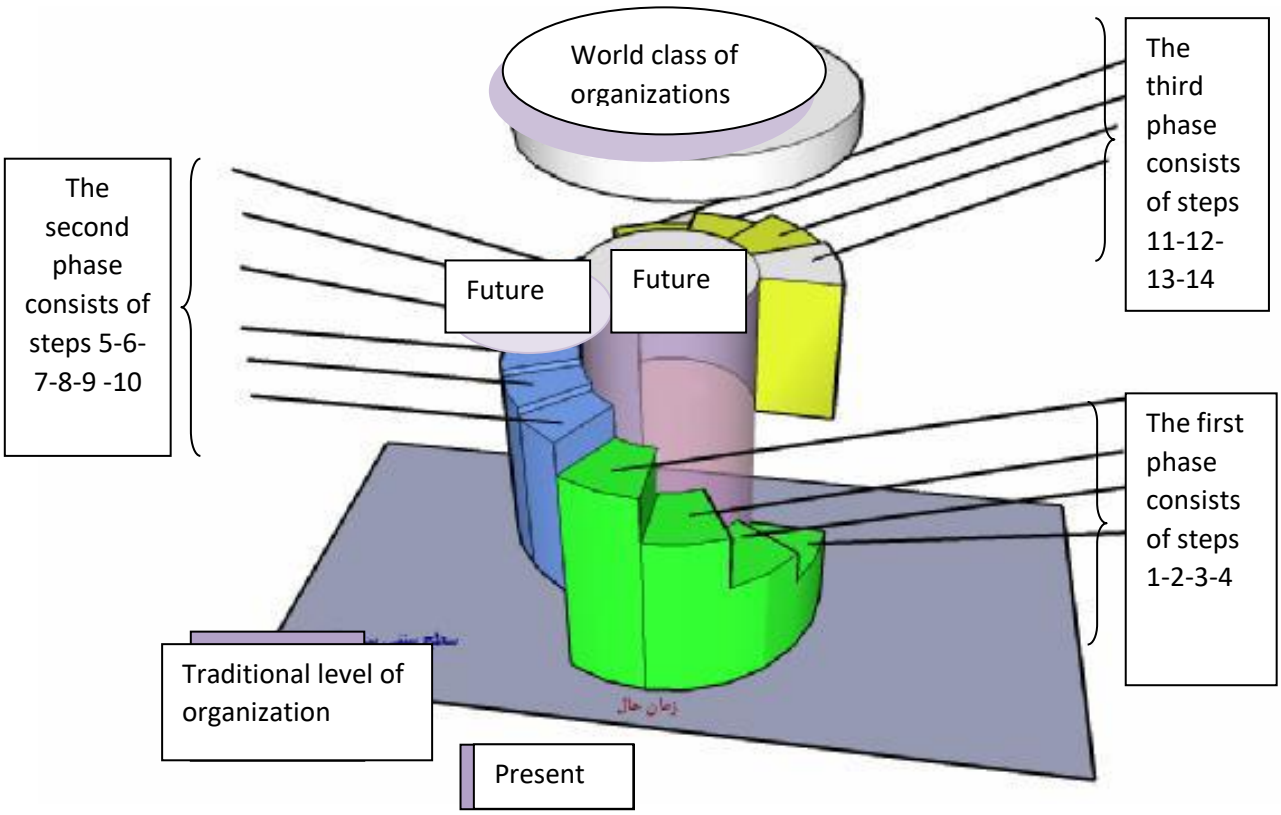


Figure1. World class manufacturing model (Development Model of Organizational Features), (Farsijani,2014).

Gajdik (2013) states that, in practice, each company has to work its own way to reach the WCM level. However, many organizations have adopted the configuration of 10 main pillars that, after their implementation, should provide the reference position in its sector of activity, as shown in Figure 2 (Gajdzik, 2013).

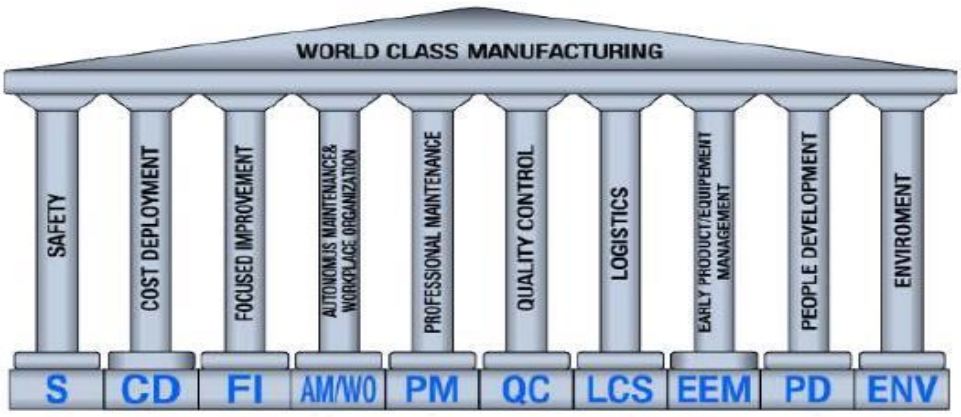


Figure 2. World Class Manufacturing pillars, Adapted from GAJDIK (2013).

Summaries.

Safaei Ghadikalaei and Dargahi in 2012 by using FAHP and FSAW techniques and using a balanced scorecard following a comparison evaluation of strategies for achieving world class manufacturing in Tabarestan Steel Co. In order to achieve the research goal, after a comprehensive review of the subject literature, the views of 8 experts and the expert of the company have been used to prioritize the strategies for achieving world class manufacturing as follows: Accepting new technology to continuous improve and develop product quality, designing products based on customer needs, identifying new domestic and foreign markets, and ultimately improving after-sales services by expanding the service network (Safaei Ghadikalaei and Dargahi, 2012).

Safaei Ghadikalaei et al. (2012), with the aim of evaluating world class systems of Iran Khodro and three Indian automobile companies using the value performance analysis, concluded that Iran Khodro Co. could have better performance only in two programming and control factors and production control and flexibility versus Indian counterparts and have lower performance in factors of commitment excellent of management, customer satisfaction, and customer service, and the rest of the factors have a moderate performance. At the end, it was suggested that Iran Khodro, in order to achieve superiority over other manufacturers in the global arena, should pay more attention to all critical factors and pay particular attention to the supercritical factors of the commitment of excellent management and satisfaction and customer service (Safaei Ghadikalaei et al., 2012).

Eid (2009) in an article entitled "Factors affecting the successful implementation of world class manufacturing in developing countries, a case study of Egypt" by stating that manufacturing factories need to understand what factors have a critical role in the application of WCM techniques, classified seven critical factors into two categories, that the first category is WCM strategic enablers, which include: management commitment, quality section, continuous improvement, and customer participation; The second category is the WCM tactical enablers that includes: supply chain

management, management of technical capabilities, and management of manufacturing facilities. Experimentally, through a 96-sample selected from Egyptian manufacturing companies, it was concluded that WCM strategic factors and tactical success factors have a significant impact on the success of WCM, and also stated that some strategic enablers also affect tactical enablers (CHIARINI, 2015).

Sangwan & Digalwar (2008), in a paper titled "Assessing world-class manufacturing systems, a case study of India's automotive industries", by reviewing the literature of the subject identified 172 variables of performance for the evaluation of WCM systems. Subsequently, 73 variables of performance were identified valid from a total of 172 variables that were classified using the nominal grouping technique in 12 critical factors categories and then, using the performance value analysis algorithm (PVA), the data obtained from three companies active in India's automotive industry which received the Malkolm Baldrig National Quality Award (MBNQA), Rajiv Gandhi National quality award (RGNQA) were compared in terms of success of world class manufacturing. Finally, the authors claim that the proposed model and algorithm have required validity and reliability using the case study, and it can be used to evaluate the automotive industry in the world (Sangwan &Digalwar, 2008).

Salahdin and Eid (2007), with the aim of implementing world class manufacturing techniques in Egyptian factories, as well as providing guidance for the successful implementation of world class manufacturing, concluded that reducing operating costs (marketing and manufacturing) and global issues (Environmental market) are important variables for the implementation of WCM. They also found that a poor program and lack of knowledge were among the most important barriers for implementing WCM in Egyptian factories. At the end, they suggested that the implementation of WCM requires knowledge growth and they stated that factories keen to implement WCM should understand this issue and insist in doing it until they get the expected profits (Borges, 2016).

Brown et al. (2007), in a paper titled "Cooperation and participation of production strategy and its relationship with world class manufacturing performance", explore the relationship between the process of developing strategy and the performance of operation of factories. Based on findings in the computer industry, this article suggests that high-performance factories should contribute both the content of strategic operations and strategic operations, together what the factories did not do with low performance. Therefore, it is suggested in this paper that the participation of operations and production managers in the strategic planning process helps to coordinate business and production strategy and this coordination is related with the high performance of production (Maurel, 2014).

According to the results of this research, the basic criteria in world class manufacturing are to compete (quality, price, delivery speed, reliable delivery, flexibility and innovation), and organizations should continuously develop new methods and perspectives to meet these needs with right time and cost effective approach, and state continuous effort to improve quality, cost reduction, waiting time, customer service, and innovation as the distinguishing aspect in the world class manufacturing.

Research methodology.

The information of this research was extracted through interviewing the experts of the university and industry, as well as the use of available statistics and documentation in relation to the industry. The present research methodology is in the category of developmental research. The statistical population of this study is industry and university experts. The fuzzy Delphi method has been used to identify the dimensions and dimensions of production in the World class, and the required information was collected through the distribution of questionnaires among the statistical population. Of the 15 experts, 4 of whom are university lecturers and 11 people at the “Gorgi company”, which are Iran's food industry companies, have been helped in this research.

CONCLUSIONS.

Since the compilation of factors contributing to world-class production is difficult, there is no significant experience in this regard either. Therefore, the nature of the problem and its solution in such a way that the achievement of objective achievements requires the cooperation and cooperation of experts. Therefore, in this paper, the Fuzzy Delphi method is used to determine the components affecting world class production. The primary core of the research, the determination of the components affecting global production through the fuzzy Delphi method was established with library studies.

At this stage, the goal is to determine the number of factors affecting global production, in which many studies have been carried out. By studying articles published in the world-class production field, 67 components were identified which, with the help of the consultant's professor, these components Reduced to 37. With respect to these components, a questionnaire was developed to obtain expert opinions on the impact of these components on their impact or their impact, as well as on their impact on world-class production. However, due to the ambiguity in applied concepts, the questionnaire was designed based on fuzzy variables that are discussed below.

In the initial phase, for identifying the variables and system parameters and the effective components in this model, experts and experts familiar with the subject of the initial consultation were consulted, and by summarizing their comments and based on the preliminary conclusion, the section Main models of the main model, including technology, management, product, production process, flexibility, human resources, customers and environmental components were identified.

Table 2. Linguistic scales (Bouzon, 2016).

Linguistic variables	Fuzzy number
Very low	(0, 0, 0.1)
Low	(0, 0.1, 0.3)
Medium low	(0.1, 0.3, 0.5)
Medium	(0.3, 0.5, 0.7)
Medium high	(0.5, 0.7, 0.9)
High	(0.7, 0.9, 1.0)
Very high	(0.9, 1.0, 1.0)

The layout of the parameter variables and variables considered for each main part of the model, in which the variable name and the assigned parameter are also mentioned (Bouzon,2016).

Assume fuzzy number ˜aij to be the jth barrier importance of the ith expert and it is given as follows:

˜ aij = (aij,bij,cij) for i=1,2,3,. . ..n; j=1,2,3,. . ..m.

Then the fuzzy weights of barriers (a ˜ j) are given as follows:

˜aij = (ajbjcj), wherea j=min{aij}, bj = (_ni=1bij)1/n, cj=max{cij}

This paper utilizes a fuzzy Delphi method (FDM) to scrutinize the important barriers identified through literature review. FDM is a combination of fuzzy set theory and Delphi method proposed by Ishikawa et al. (1993). The detailed steps of FDM are described below.

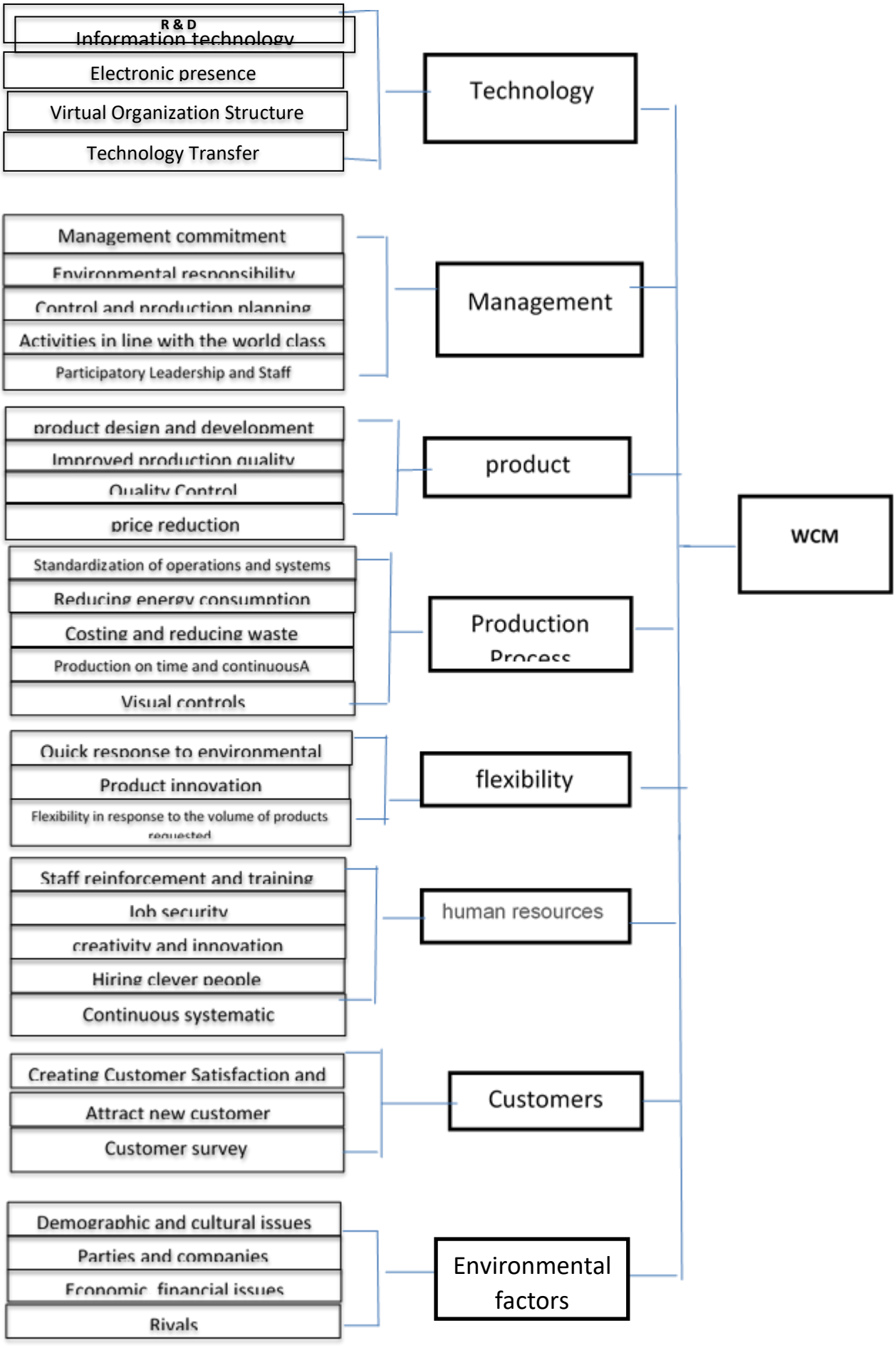
Step 1: Identify the possible barriers related to the study.

Step 2: Collect expert opinions using decision group. After identifying the barriers, n number of experts (decisionmakers) from industry and academics are invited to determine the importance of barriers through a questionnaire using linguistic variables described in Table 3.

This study uses fuzzy triangular numbers for evaluating the barriers. Also, this study uses a geometric mean model (Ma, et al., 2011) to determine the experts' group decision.

Step 3: Identification of important barriers. The final step in the FDM is identifying the important barriers,which is done through comparing the weight of each barrier with the threshold "˜a ". The value of a is calculated by the average of all barriers' weight (˜aj. The principle of screening is as follows: If˜aj≥˜athen barrier j is selected.If˜aj<˜athen barrier j is rejected. Since˜ajand˜a are a combined fuzzy set, it needs to be trans-formed into a crisp value for comparison. This paper uses a centerof gravity method to defuzzify the fuzzy values (Bouzon, 2016).

The results of the questionnaires for achieving effective factors in world-class production are presented in the table below.


R & D
Information technology
Electronic presence
Virtual Organization Structure
Technology Transfer
Technology
Management commitment
Environmental responsibility
Control and production planning
Activities in line with the world class
Participatory Leadership and Staff
Management
product design and development
Improved production quality
Quality Control
price reduction
product
Standardization of operations and systems
Reducing energy consumption
Costing and reducing waste
Production on time and continuousA
Visual controls
Production Process
Quick response to environmental
Product innovation
Flexibility in response to the volume of products requested
flexibility
Staff reinforcement and training
Job security
creativity and innovation
Hiring clever people
Continuous systematic
human resources
Creating Customer Satisfaction and
Attract new customer
Customer survey
Customers
Demographic and cultural issues
Parties and companies
Economic, financial issues
Rivals
Environmental factors
WCM

value threshold estimated		
0.72703	0.96950	1

Di fuzzy threshold value	**0.91651**	

The fuzzy value of each of the questions			Di fuzzy of amount each question	Status of each question	Percentage of consensus	Magnitude	Rating
L	M	U					
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.9	1	1	0.975	Accepted	100	0/02875	1
0.9	1	1	0.975	Accepted	100	0/02875	1
0.1	0.98605	1	0.7695392	Unverified	53.3333	0/02004	35
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.9	1	1	0.975	Accepted	100	0/02875	1
0.9	1	1	0.975	Accepted	100	0/02875	1
0	0.71759	1	0.608795	Unverified	40	0/01795	36
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.7	0.98605	1	0.9180250	Accepted	86.6667	0/02707	25
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16

0.9	1	1	0.975	Accepted	100	0/02875	1
9/0	1	1	0.975	Accepted	100	0/02875	1
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.9	1	1	0.975	Accepted	100	0/02875	1
0	0.54721	1	0.52360	Unverified	40	0/01544	37
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.9	1	1	0.975	Accepted	100	0/02875	1
0.7	0.933	1	0.9215003	Accepted	93.3333	0/02717	16
0.9	1	1	0.975	Accepted	100	0/02875	1

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RECIBIDO: 10 de junio del 2019. **APROBADO:** 24 de junio del 2019.