Gaining Strategic Positioning by Utilizing Concurrent Engineering  
(An empirical study for employees of Babylon Tires factory)  

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ABSTRACT  

The study aims to figure the nature of relationship between concurrent engineering (CE) dimensions and its impact on gaining strategic positioning in Babylon Tires factory. In this study questionnaires method has been utilized to describe operationalized relationship between study variables (quantitatively) by surveyed factory employees. Firstly, it introduces the concepts of concurrent engineering and strategic positioning. Then formalized hypotheses of the study. The main findings of the article displays statistical outcomes of surveyed employees. It shows that concurrent engineering has an over average correlation proportion with strategic positioning, besides strong and positive relationship between two variables. The Social implications of the study help manufacturing companies to utilize CE and to incorporate their wealth and actions and regulates the success and sustainability of the organization performance.  

Keywords: Concurrent engineering, Strategic positioning, Product development, Process.  

Introduction  

Concurrent Engineering is exploited by firms from 1980s so on as an methodology to scheme a novel goods or service in an perfect manner. CE substitutes an old product improvement techniques, which is a series of processes with slight harmonization among diverse functions. CE offers competitive chance for generating novel goods and services in a short duration. while sustaining the high level quality at bottom cost to respond the current market demand. The concept of concurrent engineering has been broadly applied in the business industry. there is an increased consciousness and attention in the adoption of (CE) in many Industries, because it has the possibility to make industrial projects less separated, reduce duration, enhance quality, reduce total cost and increase competitiveness( Tsai, Yang, & Liao, 2011). It is essential to take into account scheme, investigation, manufacturing and examining CE. This can be fulfilled by applying CE plans which transfers the old-style sequential duration phase on product life cycle, to the parallel manufacturing systems and concurrently to determine all the persuading aspects of a product that cover marketing sales, and providers (Ganagambegai & Shanmugam, 2012). advantages of CE is gifted, however, applying CE is not easy. Many scholars are uncover obstacles and difficulties during CE implementation (Karningsiha, Anggrahinib, & Syafi, 2015). In addition (Zhu, Zedtwitz, Assimakopoulos & Fernandes, 2016) shows that process of concurrency, formality, and adaptability (all of them organizational process factors) have a positive effect on product quality, cost, and time-to-market. Over the years, Lean has become more of a familiar in industrial strategies, now a prerequisite for the existence of every industry organization that operates in a competitive industry environment (Welo, Lyckea, & Ringen, 2019). The study has been conducted in the improvement of specializations for the healthy production to create various sizes of tires in Babylon tires factory. CE was implemented to support the progress of multiple concepts in parallel processes, driving R&D grant allocation.  

The study is designed as these points:- First, literature review regards the concept of concurrent engineering, strategic positioning and its objectives. Second, the study methodology is explained and statistical analysis of the data gathered regarding the link of CE with strategic positioning depending on the answers of respondents. Third, the results obtained from analysis questionnaire. Finally, conclusions and limitations are described.  

The aim of the study: The aim of this study is to assess the quality of relationship between concurrent engineering and strategic positioning, and the impact of its dimensions on the organization applied.

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Materials and Methods

**Concurrent engineering**

The American Institute for Defense Analysis has submitted the most known explanations of CE which considers to be “a methodical system that uses to integrate, synchronous design of goods and services and relates manufacturing processes, including making products and back up activities”. This method is proposed to reasoning the makers of developing products to take all elements of the product life cycle into account, from designing the product through discarding, including quality, charges, schedule, and customer requests”(Winner et al., 1988, p. 2)& (Valle & Bustelo, 2009).

The term of CE is also called Simultaneous Engineering. It was used in United States in 1989 for the first time. Primarily It leads to an increase the competitiveness by inducing manufacturing factors such lowering lead-time period, enhancing processes, quality and manufacturing charges (Sohlenius, 1992). Besides that, CE means that the products of engineering processes involved in life-cycle of the product are incorporated(Tiant, Xu, Wendt, & Wo, 1998). therefore, CE is relied on the cooperation and collaboration of multi-disciplinary organization employees, who need to convey the information manufacturing process (Roche, 2000). CE is a methodical style to the combined and contemporaneous development of products and its operations, that underlines answering to consumer prospects, and merges specifics organization values such cooperation, trust and sharing of information in a way that proceed decision making with large intervals of similar processing by all life-cycle perspectives, coincide by comparatively exchanges to produce assent (Landeghem, 2000). CE refers to the accept of employments efforts that have not realized their full ability in reducing costs, time, increasing efficiency, effectiveness and performance for product development (Khalfan, Anumba, Siemieniuch, & Sinclair, 2001). So, it is obvious that concept of (CE) has been known, however CE has widely familiar as a major enhancer to fast and effective product progress now (Staudachera, Landeghebmb, Mappelic, & Redaellil, 2003). To develop quality of the product, lowering cost level, reduce the duration of product development, and achieve consumers' requirements, CE requires goods and services creators to take all the elements of product life cycle into consideration (Xu, Li, Li, & Tang, 2007). Therefore, the CE regime is improved to fulfill the requests of the consumer for a best quality with decrease in manufacturing period and cost. Besides that, the goal of CE is to improve quality, reduce production costs, or improve consistency (Mohamad & Yusoffa, 2013 ). The current competitive industry setting requires more elastic, smart and compact product lifecycles, especially in the process of product development. Where several lifecycle issues have to be considered, to deliver oriented products( Demoly, Dutartre, Yan, Eynard, Kiritsis, & Gomes, 2013). Also (Sapuan & Mansor, 2014) refer to the CE as a methodical layout style which combine concurrent styling of product with the relative manufacturing operations which is able to make goods and services at low cost, shorter time and high level of quality, this achievement was termed as cost, time and quality (CTQ) development. The interests of CE has got from the fact that it is concentrated on the engineering which determines influences the overall cost of a product: as much as highly percentage of the production cost which can be committed at the design stage (Zidanea, Stordalc, Johansenb, & Raalte, 2015).

**Strategic positioning**

“Position” defines as a collection of purchasers for the product is primarily targeted(Cronshaw & Davis, 1990). (Kotler, 1996) refers to the positioning is the work of designing, creating the firm’s picture to image and communicate the products’ unique key benefits in the market, so that it occupies a different and heavily attention of the target customers. Strategic positioning in the academy derives from the concepts of competitive strategy of business literature, building on the work of Porter and others (HOFFMAN, 1998). To gain a best mind place on various markets’ segments, whether they are geographic place, demographic segment, social or economic environment, there are several strategies that can be implemented in the positioning policy of a brand, which are adopted based on the goal of the organization(Shahshir, 2007). Positioning is a concept that states comprehend likeness and variances among brands (Padgett & Mulvey, 2007 ). However, according to Porter who defined strategic positioning as “creating unique value proposition or doing things differently to deliver superior value”(Porter, 2012). Firms are pursued a cost leadership strategy search for the decreasing production cost to the bottom of curve, primarily by minimizing inputs (utilizing supply chain value) for a given level of output, thus focusing on levering the efficiency of their manufacturing processes(Chang, Fernando, & Tripa, 2015). Whereas some scholars refers to Positioning as an aggregation of novel actions that utilize consumers’ mind towards their favorite product. That emphasis positioning starts with a product and ends with making a space and inhabiting in the consumers’ minds. Strategic Positioning argues that a famous brand only holds a unique space in consumer’s mind which may be difficult for the competitors to work, and this consumer mind space would be maintained with well-articulated strategies.
focusing on marketing mix elements (Kamau & Wafula, 2015). The sole place of mind strategy for an enterprise manages decision making in a strategic way, and inspires the engagement of decisions takers. The market position of a firm compared to its rivals in business environment in a same industry (Dang & Yeo, 2017). Granting a distinctive strategic position is straight linked to (and depends on) the capability of an organization to create value that differ from the value offered by its rivals especially to organization consumers (Dimitrova, 2017).

Research methods
Styling the study questionnaire, a literature review on CE as well strategic positioning have been carried out. it is very significant step to enable understanding the concepts of applied variables. The multi standards in CE and strategic positioning, has been proposed by this study, uses quantitative numerical indicators to select best processes (Shahrokhi, Bernard, & Shidpour, 2011).

It is essential to determine the significant dimensions of the variables. Therefore a numerical analysis could be done based on the questions answered. The survey has to be clear and brief to make sure that the respondents would not be disordered with the answering of the questions. Afterward, it must be retrieved and adjusted according to the subjects and the language grammar of the study. This is to make sure that the respondents would know the questions. The questionnaires would be filled by respondents. Three months are assigned for getting the questionnaires. During the permitted duration, the respondents would be reminded of the deadline for getting back the filled questionnaires. In controlling feedbacks from respondents and to confirm how many respondents know the concepts of CE and strategic positioning have practiced it, direct questions would be carried out through interview after having the questionnaires from the targeted respondents. The obtained data characterized, coded and analyzed. Then a conclusion and discussion are made consequently to explain the outcomes.

A literature study was first done to comprehend the concepts of CE & strategic positioning. Based on the literature review, three dimensions for the variable concurrent engineering are identified. Whereas one dimension only determined for the strategic positioning. These dimensions are coped with the environment of applied organization. These will be used for assessing the impact of CE on strategic positioning in the study below:

1- Concurrent engineering dimensions:- (Sohlenius, 1992), (Barahona, 2003), (karlson et.al., 2008), (Tiant, Xu, Wendt, & Wo, 1998), (Starbek & Grum, 2002), (Belay, 2009), (Elram, Tate, & Carter, 2007), (Zidanea, Stordalc, Johansenb, & Raalte, 2015).
   i- Product design
   ii- Process design
   iii- Supply chain value

2- Strategic positioning dimension: (Chang, Fernando, & Tripa, 2015).
   a- Hypothesis development:- The main hypothesis for this study.
   H1: concurrent engineering has a significant and statistical impact on strategic positioning.

b- Data collection
Firstly, we have to conduct a survey to organizations employees, then get reaction of the problem faced showing the an impact of CE on strategic positioning. The survey of the variables study has been conducted by interview the applied organization employees. Which is done at (Babylon Tires Factory). 100 respondents involve in this session.

c- Result
Table 1: Show the correlation between variables.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Product Avg.</td>
<td>Pearson</td>
<td>.579**</td>
<td>.509**</td>
<td>.628**</td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>Process Avg.</td>
<td>Pearson</td>
<td>.680**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.000</td>
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<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>Supply Avg.</td>
<td>Pearson</td>
<td>.705**</td>
<td></td>
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<tr>
<td>Correlation</td>
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<td>Sig. (2-tailed)</td>
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<td>N</td>
<td></td>
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<td>101</td>
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<tr>
<td>Strategic Avg.</td>
<td>Pearson</td>
<td></td>
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<tr>
<td>Correlation</td>
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<tr>
<td>Sig. (2-tailed)</td>
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</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

In terms of the results, that got from the survey. Table (1) shows the correlation rate among the variables of the study. As below:

1- The higher correlation ratio is supply chain with strategic positioning (70%).

2- The less higher correlation is occurred between process design and strategic positioning (68%)

3- The less correlate has occurred between product design and strategic positioning (62%).

Table 2: Show the regression among variables.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.782</td>
<td>.611</td>
<td>.599</td>
<td>.522</td>
</tr>
</tbody>
</table>


The Table (2) shows the existence of a positive regression (with $R^2$ 0.78) between the CE and the dependent variable (strategic positioning) in a factory. The study also showed that the significance ratio which is smaller than 0.05, which leads to an acceptance for a main hypothesis (there is a relationship between CE and strategic positioning) in Babylon Tires Factory. This intensely recommended that factories must implement CE approach as one of their profitability direction to acquire strategic positioning.

Table 3: Regression Analysis.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41.560</td>
<td>3</td>
<td>13.853</td>
<td>50.78</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Residual 26.461</td>
<td>97</td>
<td>.273</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total 68.021</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Strategic Avg.

b. Predictors: (Constant), Supply Avg, Product Avg, Process Avg
<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.559</td>
<td>.262</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.286</td>
<td>.073</td>
<td>.308</td>
<td>3.930</td>
<td>.000</td>
</tr>
<tr>
<td>Process Avg.</td>
<td>.194</td>
<td>.097</td>
<td>.205</td>
<td>2.011</td>
<td>.047</td>
</tr>
<tr>
<td>Supply Avg.</td>
<td>.399</td>
<td>.098</td>
<td>.394</td>
<td>4.071</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Strategic Avg.

In table (3) regression analysis, the difference with 95% ratio of confidence, based on statistical analysis ANOVA. It shows that significance (0.000) of the model emphasizes one of the most stated fundamentals for success, the fact that top management has stated the work operations necessities for applying CE towards getting Strategic positioning.

**Conclusion and Discussion**

- Most of the employees rate concurrent engineering techniques as effective to gain strategic positioning.
- Significantly higher correlation between strategic positioning (dependent variable) and concurrent engineering dimensions (product design, process design, and supply chain value) with almost (65%) strength. Which have an important influence on manufacturing cost.
- Collaboration with contractors and clients is widely recommended within industry.
- CE tools and techniques, such as 'supply chain and 'Design new product (Tires) are adopted very rarely.
- Process technologies is also highly recommended, indicating tires factory has the necessary infrastructure for increased utilizing modern operation technologies.
- The applying of CE will reflect an impact on lowering production cost. Which leads the factory to adopt cost leadership strategic.

Examination of the typical study and its analysis clearly reveals that the importance of concurrent engineering approach in the design and development of a product and process to gain strategic positioning. Considerable reduction in the production cost and processing times and the enhanced quality in terms of reduced rejections during the production of vehicles tires employing different facilities options for manufacturing. Finally, though the validity of the CE scale has been tested, it only takes in to account three key dimensions, excluding others that are important such as supplier and consumer involvement in the CE process. Thus, bearing in mind that CE is probably a clear determining factor for including customers and suppliers in the process, future studies should measure and consider the inclusion of external agents in the analysis. Additionally, the new information technologies have become essential for establishing a suitable link amongst all the agents participating in the product’s engineering process. The use or absence of such technologies might affect the results of CE. It would be of special interest to study to what extent the combined application of several CE-related policies(concurrent work-flow, early involvement of participants, team work, customer and supplier inclusion, use of new information technologies,) or a special combination of any of them—is more effective than applying them individually. Finally, this research focuses on the analysis of study variables. However, the effectiveness of CE might also be affected by the company’s external environment, i.e. the level of dynamism, complexity and uncertainty.

**Limitation**

Although there are different dimensions of concurrent engineering, this article is limited to three of the most used ones: product design, process design, and supply chain. In addition, the results were limited to subjective-in contrast to objective-performance measure.

**References**

new methodology to analyze the functional and physical architecture. Procedia, 43-48.


Appendix