



Review Article

The development of the Hyundai Production System: The historical evolution



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ABSTRACT

While the Toyota Production System (TPS) and its derivations have been widely adopted by industrial or services organizations along the past 50 years, alternative production systems have shown relevant results. In recent decades, a Korean vehicle producer has attracted attention due to its significant raise of market-share in the automotive world industry. The Hyundai Motor Company (HMC) developed a production system characterized by: Modularization, Automation, Just-in-Sequence, Supply Chain Management, and Flexible Manufacturing Systems. Based on literature and documental review, this paper discusses critical incidents and key features that shaped the Hyundai Production System (HPS). The paper chronologically characterizes the critical incidents identified, and analyzes the attempts to introduce different features in this system, considering these events. As main result, the influence of contextual features and historical events on the decisions made by the HMC are analyzed, seeking to provide better understanding about the development of HPS.

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Contents

1. Introduction.....	47
2. The Hyundai Company and the establishment of the Hyundai Motor Company.....	48
2.1. Phase I: the establishment of the HMC (1967–1975).....	49
2.2. Phase II: The attempt to introduce the TPS (1976–1998).....	49
2.3. Phase III: From the 1998 economic downturn to the creation of the HPS (1998–2007).....	51
2.4. A summary of the main critical incidents identified.....	53
3. Discussion.....	53
4. Conclusions.....	56
References.....	57

1. Introduction

In recent decades, while the Toyota Production System (TPS) and its derivations, namely lean production systems, influenced the restructuration of the automobile industry, other industries and the services sector, alternative production systems were developed in Europe and America without harming the perception that the TPS is a world-class production system [1], or that the car is indeed the machine that changed the world [2].

The review of the literature on Lean published in over a quarter of a century leads to infer that the TPS highlighted the concept of eliminating waste and creating production flexibility in an integrated manner. But it was the Lean concept, proposed by Krafcik [3] and Womack et al. [2] that was systematically adopted around the world, with its tools, techniques, and best practices to support operational improvement. Its diffusion may be attributed to its focus on reducing waste, increasing delivery speed, reducing costs and improving quality of products and services, making Lean a benchmark in Operations Management [4].

Nevertheless, not all car manufacturing companies took the same track to develop their production systems, such as Volvo, Volkswagen, Scania, and the Hyundai Motor Company (HMC). The

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latter sparked the interest from both companies and the academy due to the significant results it achieved [5,6].

In 1993, the HMC was ranked as 20th in the global market of car manufacturers. Back then the company board launched a long-term strategic plan called Global Top-10, whose aim was to place the HMC amongst the world's top 10 largest car manufacturers by the year 2000 [7]. By the 1990's, the company had reached economy of scale, with estimated annual production capacity of 2 million vehicles [8]. In 1998, the Toyota Motor Company ranked as the third largest car company in the world, with 5,210,000 units produced, while the HMC held the 15th position, with 899,000 vehicles. By 2013, while Toyota was producing 10,324,995 cars a year, reaching the top position in the ranking, a growth of 98.16% in that 15-year period, the HMC produced 7,233,080 units, which represents a 704.56% growth along the same timespan [8,5,9,10]. In 2010, the South Korean automobile manufacturer rose to the fourth position amongst the world's largest car companies, a status that it has sustained until 2013. The motorcar market increased by approximately 64.10% in the same period [56].

The rapid growth achieved by the HMC raised questions about how its production system was established to support the company's market strategy, especially considering that the Hyundai Production System (HPS) is not an openly known approach as the TPS or Lean are, and little has been published on the production model used by the HMC, as opposed to the considerable body of literature about the production systems based on the TPS [8,5,11].

From the above expressed argument, a dialectic context arises. On the one hand, considering the perceived advantages enjoyed by Toyota under a scenario of global competition in the automobile market, it is reasonable to understand why the seminal ideas of the TPS have spread worldwide, being adapted to Lean and other derivations in line with different contexts of industrial and service production systems [4]. As a consequence, the TPS was adopted by other car manufacturers and industries globally, taking various profiles, such as joint ventures like the New United Motor Manufacturing Inc. (NUMMI), in essence a technology transfer effort between Toyota and the General Motors Company in the USA [12]. The TPS was also the subject of learning-and-adaptation approaches. Examples include the creation of the Lean Methodology as part of the International Motor Vehicle Program (IMVP) launched by the Massachusetts Institute of Technology (MIT) [2], and the adaptation to services and other industries [13,14]. Therefore, the term *lean production* has gained more relevance in the industrial environment, becoming one of the most applied production models in discrete manufacturing processes in recent decades [15–18,4].

On the other hand, despite the recognized gains associated to the TPS or its derivations, other approaches have been developed. For Netland [6], the introduction of the Chrysler Operation System in 1994 was among the first initiatives towards the systematization of a firm in the efforts to implement lean production as it had been done by Toyota. Similar production systems include those effected by other major car companies such as Mercedes-Benz, Opel, Audi, Volkswagen, and Ford [5,6], apart from NUMMI [12].

The South Korean car manufacturer Hyundai early dropped the attempts of adopting the TPS to follow a different pathway, due to social, contextual, and organizational factors [5]. In the same way, other attempts to implement the TPS outside Toyota may have failed due to disregarding social, contextual and organizational aspects of that company and its historical moment [5]. Thus, to understand how the HPS has been shaped would require interpretivist approaches, such as critical incident analysis.

Critical incident denotes any observable human activity that reaches a sufficient degree of completion to afford interpretations and predictions about the actor that carries out an action. To be crucial an event must occur in a scenario where the aim of the act itself is reasonably clear to the observer and where the conse-

quences thereof become sufficiently clear, leaving little room for doubts as to its effects [19]. Several relevant events occurred during the development of the HPS, such as the establishment of the HMC, the attempt to adopt the TPS, the troublesome relationships with the company staff, and the choice to direct production based on an engineering framework.

In this sense, this study analyzes the influence of critical incidents on the creation of HPS. To do so, a historical narrative since the HMC's foundation to the implementation of HPS is presented, based on literature review and document analysis. This narrative is used to discuss HMC's growth, suggesting a historical division into three stages defined by those events, and sustaining an analysis of the HPS with special emphasis on its technological and technical features.

Peer-reviewed articles indexed in Scopus or Ebscohost databases, retrieved using the keywords 'Hyundai Production System' or 'Hyundai' and published between 1960 and 2014 were analyzed. As result; 18 articles were selected (Table 1) and systematically reviewed based on an analysis of titles; abstracts; and contents [20]; focusing on evidence of the structure of the HPS or critical incidents that took place in the HMC.

The remaining parts of this paper are structured as follows: the next section presents the integrated narrative of the historical evolution of the HPS, considering the occurrence and influence of critical incidents identified along HMC's history. Then, an analysis of the critical incidents and the decisions taken by the HMC towards the establishment of the HPS is presented. Finally, some considerations and suggestions for further research are drawn, under the title of conclusions.

2. The Hyundai Company and the establishment of the Hyundai Motor Company

HMC's roots first grew from a car repair shop in the Seodaemun district of Seoul, South Korea, named 'Hyundai' ('Contemporary' in the English language). The company was founded by Chung Ju-yung, in 1946. As most cars running in Korea at that time were government property, Chung actively acted to win maintenance contracts for these vehicles. He had realized that building contractors would secure higher income inflow from the South Korean government. So, with the help of Chung Na Young, his elder brother knowledgeable about English, he seized the opportunity to make further contacts with North American soldiers. This was the gateway to win contracts with the US military based in South Korea and, subsequently, with the South Korean government [21].

At that time, South Koreans concentrated their efforts on the reconstruction of their country after the armistice of the Korean War, in the beginning of 1953. Hyundai got important government infrastructure contracts such as the right to build part of the 430-km-long Seoul-Busan highway, which connects the country's capital city to its second city in size and largest harbor. By the end of the 1950's, the company was then called Hyundai Construction, having grown to become one of the main building contractors in South Korea.

During a long development stage (1961–1988), the company aligned its growth strategies to government policies: the government and large companies needed one another. Chung realized that companies and the government had distinct yet complementary resources regarding their common objectives. In 1962, the South Korean government passed a series of regulations to boost the development of the national automobile industry based on a tax structure aiming to curtail imports and, therefore, fight off outside competition [7]. Soon after the company started an expansion program, still concentrating efforts in the building industry and investing in large-scale cement plants, followed by heavy equip-

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