



**INDUSTRIAL ENGINEERING MANAGEMENT CONCEPTS
KNOWLEDGE TRANSFER TO TARGET SUBJECTED STUDENTS
USING THE JAL INVESTMENT IN BOOM CASE STUDY**

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ABSTRACT

A case study approach at which subjected students are arranged and grouped into teams, requires each individual subject to contribute towards an adequate level of cohesion, which would then facilitate, bilateral and multilateral communication and exchange of information elevated to a useful form of knowledge transfer and adaptation required for the assessment process of the team comprehension competence. Whereas a conventional unilateral method of teaching

industrial engineering management concepts, requires knowledge transfer based on a taught subject matter communicated to the subjected students, who are required to memorize the knowledge gained from the taught subject matter material covered in the class, then assessed on their competence to retrieve the information. The investment of Japan Airline JAL in the new supersonic aircraft currently under development by Boom, was selected as a case study, assigned to the subjected students, for the purpose of industrial engineering management knowledge transfer on the subject matter of, the business level making strategy process and innovation management. The assessment focused on the subjected students' depth of understanding, how well they managed to derive organizational sustainable competitive advantages from the perspective of technological cycles, seizing the viable opportunities and transforming them into a business level cost leadership positioning strategy and a business level differentiation positioning strategy.

KEYWORDS: Sustainable Competitive Advantages, Cost Leadership Positioning Strategy, Differentiation Strategy

1. INTRODUCTION

The techniques of managing change places a great amount of emphasis on the importance of engaging the people affected by change in the change management process itself. The purpose for engaging people in the change management process is to adapt new proposed setup of organizational policies and procedures as a form of reinforcement for the new setup to replace a preceding setup of policies and procedures (Kotter, 1995). The same technique could be adapted for the teaching of industrial engineering management concepts, at which the affected students engage in presenting their information gained through exposure to assigned case studies, enabling them to express and elaborate their depth of knowledge on the taught subject matter with a potential higher effectiveness rate contrary to a conventional unilateral method of teaching. A case study approach at which subjected students are arranged and grouped into teams, requires each individual subject to contribute towards an adequate level of cohesion, which would then facilitate, bilateral and multilateral communication and exchange of information elevated to a useful form of knowledge transfer and adaptation required for the assessment process of the team comprehension competence. Whereas a conventional unilateral method of teaching industrial engineering management concepts, requires knowledge transfer based on a taught subject matter communicated to the subjected students, who are required to memorize the knowledge gained from the taught subject matter material covered in the class, then assessed on their competence to retrieve the information. However, the conventional unilateral method of teaching industrial engineering management concepts does not assess the subjected student's depth of understanding and acquired knowledge of the taught subject matter.

2. METHODOLOGY

The investment of Japan Airline JAL in the new supersonic aircraft currently under development by Boom (Boom, 2018), was selected as a case study, assigned to the subjected students, for the purpose of industrial engineering management knowledge transfer on the subject matter of, the business level making strategy process (Hart and Banbury, 1994) and innovation management (Anderson et al, 1997). The assessment focused on the subjected students' depth of understanding, how well they managed to derive organizational sustainable competitive advantages from the perspective of technological cycles, deplete opportunities

and materialize them into a differentiating business level positioning strategy with respect to the identified influential external environments, as the main force for change management. The subjected students grouped into teams, six members per team, carried out their study on the JAL investment in Boom case study, after the taught material on the subject matter of organizational strategy (Hart and Banbury, 1994) was completed and prior to carrying out the taught material classes on the subject matter of innovation management (Anderson et al, 1997). The subjected students carried out an environmental scanning on the external environment affecting the supersonic aircraft business sector related to Boom, identified the potential incremental technology opportunities most suitable for a business level cost leadership positioning strategy for Boom from their perspective. Furthermore, they also identified a suitable business level differentiation strategy for JAL linked with Boom.

3. The sustainable competitive advantages of an organization

Management consists of the planning, organizing, leading and controlling functions with the objective to get work done through others in the most efficient and effective way. In order for an organization to be effective and efficient, the identified advantages of the services and products offered to targeted customers must encompass attributes of value, rare, imitable and non-substitutable (Barney, 1991) within the greater scope of porter's five industry forces (Porter, 1980). Particularly emphasizing on the threat of substitute products and services as well as the threat of competing product and service new entrance, both identifiable through the scanning activity of an organization external environment, with the objective to identify arising threats reflected by falling short in the competitive advantage. The counter measure for the identified threats is the identification of opportunities for potential growth, increasing the gap between an organizations advantage in contrast to competitors lagging competitive advantages. Succeeded with the transformation of opportunities into a business level positioning strategy in the form of a cost leadership strategy and differentiation strategy.

4. A business level cost leadership-positioning strategy for Boom

The subjected team members identified the enhanced fuel efficiency, enhanced wing aerodynamics and the reduction of the associated supersonic shock-wave noise pollution of the Boom supersonic aircraft design, as an opportunity derived out of the supersonic aircraft business threat extracted from the supersonic aircraft predecessor, Concorde, external environment. In the form of an incremental change of the existing technology, in contrast to

discontinuous change, where technology consists of seeking knowledge, technique and tool enhancement.

The commercial supersonic aviation segment retracted for almost two decades with the retirement of the Concorde, which financially failed to cover the high operation cost caused by the environmental restrictions on sonic booms, inefficient fuel consumption, and other factors (Wired, 2018). The Federal Aviation Administration (FAA, 2018) is currently revising and assessing potential new regulations for the commercial supersonic aviation segment, suspending domestic supersonic flights over land in the USA for now, due to the sonic boom shockwaves produced by aircrafts cruising at supersonic speed. The FAA proposed two new regulations that could lift the ban of commercial supersonic domestic flights. The first regulation proposed to issue a noise certification for supersonic aircrafts and the second regulation suggests a clarification of procedures required to obtain special flight authorization to carryout supersonic flight tests in the U.S. None of the two proposed regulations will lift the current ban of domestic supersonic flights over land without special FAA authorization.

The maximum cruising speed for domestic commercial flights in the USA is constraint to Mach 1. The FAA is collaboratively working together with other national aviation authorities within the International Civil Aviation Organization (ICAO, 2018) Committee on Aviation Environmental Protection CAEP to develop international noise and emissions standards appropriate for future supersonic aircrafts and the engines that power them.

Table 1: Boom versus Concorde comparison.

Supersonic Aircraft	Concorde	Boom
Material	Many Composed Material	Carbon-Fiber
Aerodynamics	Wend Tunnel Testing	Computer Simulation Testing
Engine	Require After burns	No Need for After Burn
Speed	Mach 2.02	Mach 2.2
Capacity	100 Seat	45- 55 Seat
Ticket Price	\$15,883 (British airways)	Could be as low as \$5000

The proposed delta wing of the Boom, in contrast to the Concorde, enhanced to a much sharper delta shape, where the Concorde delta wing had a curvier delta wing at the attachment point to the fuselage. The knowledge of a more enhanced performance with a sharper delta wing, at the time when Concorde was developed, already existed but not the economically viable techniques for a mass production of sharp Concorde delta wings, due to

the underdevelopment of available made fiber-carbon material then. The wide range made available fiber-carbon material nowadays enables a viable economic mass production of a sharper Boom delta wing, reducing the foreseeable manufacturing cost for a supersonic Boom aircraft in comparison to its predecessor the Concorde. The enhanced computer simulation testing technique made available nowadays for the Boom aircraft, in contrast to the conventional wind tunnel testing only of the Concorde diverse designs, prior to the physical testing of a prototype also contribute to a lower research and development cost that lead to lower production operation cost as show in table 1. The Boom aircraft is 75 % more efficient than the Concorde due to the elimination of the after burners in the engine, with a 30 fold reduced noise factor (Wired, 2018). Thus, enabling Boom to offer its aircraft at a lower price tag in context of a business level cost leadership positioning strategy. JAL investment in Boom would also enable JAL to offer supersonic flights at a regular business class price tag far lower than the Concorde first class only seat price tag, adapting a business level cost leadership strategy for a premium differentiated positioned service in the market.

5. A business level differentiation strategy for JAL linked with Boom

The subjected team members identified the investment of JAL in the Boom supersonic aircraft, as a prospector's adaptive strategy for JAL with a higher appetite for taking calculated risk, targeting the business class travelers segment. The investment appears to fit JAL's strategy of investing in adjacent markets to offset lost revenues as major competitors such as United Airlines a Star-alliance member and Cathay Pacific, offer more transpacific non-stop flights, overflying the One-world alliance carrier's hub in Tokyo despite the Hong Kong based Cathy Pacific also being a member of the One-World alliance. The strategic alignment between JAL and BOOM enables JAL to inject its aviation experience as an airliner, in the BOOM supersonic aircraft design fine tuning process. The commitment of JAL in the BOOM project, supported with an investment of 10 million USD will also help to redefine the passenger experience on supersonic travel, complementing the corporate vision of JAL of targeting customers worldwide, from region to society (JAL, 2017). Transforming into a true global airline, which aims to create new values to its targeted segment of customers one-step ahead of competitors, steering towards continuous sustainable growth.

6. CONCLUSION

The objective of this paper was to emphasize the effectiveness of using a case study approach for the transfer of industrial engineering management concepts, to targeted subject students.

Whereas, a conventional unilateral method of teaching industrial engineering management concepts, requires knowledge transfer based on a taught subject matter communicated to the subjected students, who are required to memorize the knowledge gained from the taught subject matter material covered in the class, then assessed on their competence to retrieve the information. A case study approach at which subjected students are arranged and grouped into teams, requires each individual subject to contribute towards an adequate level of cohesion, which would then facilitate, bilateral and multilateral communication and exchange of information elevated to a useful form of knowledge transfer and adaptation required for the assessment process of the team comprehension competence. The subjected student team members carried out an external environment scan of the supersonic aircraft business related to the Boom supersonic aircraft, then identified the opportunities on which basis sustainable competitive advantages were derived and transformed into a business level cost leadership positioning strategy and business level differentiation positioning strategy.

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