Catch-up Process in Aircraft Industry: A Model Based on Experiences of Six Latecomer Countries

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ABSTRACT

This article presents a staircase model for the catch-up process in the aircraft industry based on Reverse Product Life Cycle (RPLC). The model is composed of five consecutive phases: (1) maintenance and repair; (2) licensed production; (3) enhancing technological capabilities; (4) independent aircraft development from behind the technology frontier; and (5) independent aircraft development at the technology frontier. In order to propose this model, the catch-up processes in the aircraft industry in six latecomer countries (Brazil as a successful case, Japan and China which are still in the catch-up process and Romania, Indonesia and Argentina as unsuccessful cases) were studied. Then their activities in the catch-up process were categorized based on Miles and Huberman's data analysis method. Finally, the catch-up processes of all surveyed countries were considered on the same timeline, to gain a better perception about dynamics of different phases of the catch-up process in the aircraft industry. This suggested some ideas about: (1) overlaps between different phases; (2) relative size of different phases; and (3) different possible routes between phases. It was also concluded that in the aircraft industry, evolution based on sequential steps is more successful than jumping between different steps. The validity of the model is checked by its conformity with other studies on catch-up models. In addition, the catch-up processes of all surveyed countries were successfully mapped to the proposed model.

KEYWORDS

Aircraft, Catch-Up, CoPS, Latecomer, Staircase Model

1. INTRODUCTION

CoPS are high-cost, technology- and software-intensive, customized, capital goods, systems, networks, infrastructures, engineering constructs and services, produced in small-batches or one-off projects to meet the requirements of business or government users (Park, 2012). Some examples of CoPS are telecommunication systems, aircraft and power plant systems (Miller et al., 1995). One way to illustrate the defining characteristics of CoPS is differentiating them from mass-produced goods (Davies & Hobday, 2005); there are at least two important differences: (1) CoPS are comprised of many interdependent elements that are often themselves complex, customised and high-cost; and (2) often are produced in small batches or projects (Hobday et al., 2000).

DOI: 10.4018/IJSKD.2018010103

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Historically, CoPS was first developed and used in industrialized countries. Than developing countries became the market of these products (Kiamehr, 2013). Nowadays, these newcomer economies are attempting hard to achieve be able to develop and produce CoPS (Davies & Brady, 1998). This occurs as: (1) Latecomer firms act as sub-contractors to major international systems integrators; (2) Domestic CoPS industries emerge; (3) Firms try to support export oriented industries by producing related CoPS; and (4) When governments seek to support strategic and high-tech industries for national goals (Hobday et al., 2000).

Nevertheless, it is not easy for latecomers to get a chance to catch-up with CoPS’ pioneers (Park, 2012). Some reasons are as follows: internal weaknesses of latecomers in CoPS, inadequate time to acquire the capabilities needed to develop CoPS, due to being in the early stages of industrial development and CoPS market’s characteristics (Miller et al., 1995). In addition, the most compelling reason is that the life cycle of CoPS remains in the fluid phase of innovation in the product and the rate of innovation in the product can remain relatively high (Davies, & Brady, 1998).

At the other hand, Due to considerable differences in innovation process, the management approaches and its challenges are fundamentally different between CoPS and mass-produced goods (Hansen & Rush, 1998). Therefore, independent studies are required that specifically focus on CoPS’ management issues (Acha et al., 2004), like catch-up process.

Aircraft industry is a high-tech industry traditionally dominated by companies based in developed countries (Goldstein, 2002a). For many politicians, managers and academics, this sector is the quintessential ‘strategic’ economic sector (McGuire, 2011). The civilian aircraft industry accounted for $130 billion in global revenues in 2010 (Sturgeon et al., 2013). Also, all major forecasts agree that passenger growth will continue rising so the market would double in 2029 in comparison with 2010 (McGuire, 2011).

Aircraft is a relatively standardized product, but the aircraft industry is CoPS-like in most other respects: the aircraft is completely complex with major subsystems being complex themselves. Therefore, Major studies of high-tech sectors categorize aircraft as CoPS (McGuire, 2011).

Many latecomer countries have tried to catch-up in this sector because of its strategic nature. However, aside from being complex, other characteristics of the aircraft industry militate against market entry (McGuire, 2011). In this way, in recent years just Brazil and Canada have succeeded in the regional jet market. Many other latecomers have failed in catching-up (McGuire, 2011) and many established companies in the industry have forced to leave the industry voluntarily or involuntarily (examples include: Lockheed, Saab, Fokker, McDonnell-Douglas (MDD), British Aerospace (BAe), Raytheon and Fairchild Dornier (Steenhuis, 2004)).

As described in section 2, most of studies on catch-up are about mass-produced goods. Therefore, as many latecomers are trying to catch-up in CoPS, it is necessary to study this topic more. In addition, the different CoPS sectors need to be studied independently due to their intrinsic differences.

This paper presents a model of catch-up in the aircraft industry based on studying six latecomer countries that have catch-up in this area.

Although other researchers have studied catch-up in other CoPS industries or have studied catch-up of some countries in the aircraft industry, but no specific research have yet focused on: (1) the catch-up process in the aircraft industry itself; and (2) reviewed this broad range of countries to conclude about the catch-up process.

The rest of this paper is structured as follows: Section 2 defines the catch-up and latecomer concepts. Then it reviews the catch-up processes of six latecomer countries in the aircraft industry. Section 3 describes the research method of this study. Section 4 summarizes the empirical findings, and surveys their conformity with the catch-up literature and evidence from case studies. Finally, section 5 concludes the paper, touching limitations of this study and its implications for future research.
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Patrícia Albergaria Almeida, José Joaquim Teixeira-Dias and Jorge Medina (2013).
*Governance, Communication, and Innovation in a Knowledge Intensive Society* (pp. 140-152).
[www.igi-global.com/chapter/students-questioning-creativity/76601?camid=4v1a](www.igi-global.com/chapter/students-questioning-creativity/76601?camid=4v1a)

Online Friction: Studying Micro-level Sociotechnical Conflicts to Elicit User Experience
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