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Outsourcing in Aviation Technical and Information Technology Services: A Comparative Study of Maturity Development

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Abstract:

Purpose: This paper analyzes the longitudinal development of outsourcing research and practical applications in aviation technical services through a comparison with information technology (IT) outsourcing to find commonalities, differences, and trends. Although these large knowledge-intensive industry segments have different boundary conditions, they both have a long history in outsourcing.

Design/methodology/approach: Results from longitudinal expert interviews conducted in 2014 and 2020 are analyzed using a maturity model and compared to input collected from the literature.

Findings: Outsourcing in both segments follows the path indicated in the maturity model, with some variations. In aviation technical services, elements from earlier maturity stages are retained both in research and practice, while in IT, new technologies bring the focus back to elements seen in lower maturity stages. Aviation has advanced further in maturity than IT outsourcing, despite IT being a larger and more widespread segment.

Research limitations/implications: The interviews conducted were mainly with Finnish experts from internationally operating organizations. However, the possibility of geographical bias is considered small, as practices in both studied segments are truly international.

Social implications: Well-functioning outsourcing is an essential part of modern organizations' strategic set-up. Understanding the longitudinal development patterns helps both vendors and clients to prepare and adapt for the future.

Originality/value: Maturity models have not previously been used for a longitudinal study of outsourcing development. Comparing outsourcing in two large segments contributes to understanding of the effects of regulation, differing client preferences, and innovation.

Keywords: outsourcing, maturity development, aviation, technical services, information technology services

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1. Introduction

This paper compares longitudinal outsourcing development in aviation technical services [often referred to as maintenance repair and overhaul (MRO)] and information technology (IT) outsourcing (often referred to as ITO) using cases and expert interviews for both.

While aviation is strictly regulated, leading to high entry barriers, IT is a segment with low regulation and very low entry barriers, which makes it easier to establish innovative start-ups and small- to medium sized enterprises (SMEs). ITO is also a widely used example in outsourcing research, thus serving as a good reference point for studying aviation MRO outsourcing. Liang, Wang, Xue and Cui (2016) identified 798 ITO-related research papers published between 1992 and 2013, and Corbett (2004) noted that physical activities (such as cleaning and food preparation) are those most easily outsourced, followed by specialist areas (including IT, legal, travel, etc.).

The direction of development and the speed of possible change are relevant ways to compare ITO and MRO outsourcing, as outsourcing is not considered to be particularly segment-specific. This study reveals that, contrary to possible intuitive thinking, regulation and high entry barriers in aviation MRO do not slow down the outsourcing maturity development on an industry-segment level, but rather assist it compared to the ITO segment.

Elfring and Baven (1994) presented "cooperation" as an alternative to the more traditional "make" and "buy" options for performing functions in an organization. Their study highlighted the importance of learning from outside organizations as a key element of development in knowledge-intensive organizations.

Corbett (2004) stated that, initially, outsourcing was performed to reduce costs, being later also considered to help organizations achieve greater focus, greater access to skills, revenue growth, quality improvement, capital conservation, and increased innovation.

Another important element in deepening the partnership between vendor and client, and the use of knowledge management to foster this, is the sharing of information. In this context, Pérez-Salazar, Aguilar, Cedillo-Campos and Hernández (2017: page 711) concluded that "knowledge management can be viewed as a leverage mechanism for: (i) supply chain integration; (ii) the enhancement of intra and inter-relations across the supply chain; (iii) supply chain strategy alignment; and (iv) the reinforcement of knowledge transfer in product development."

The literature assumes that outsourcing has developed from a strict contractual "buy" relationship (often very cost-savings focused) towards a more partnership-like, trust-based relationship.

Supporting this development, Gottschalk and Solli-Sæther (2006) presented a three-stage maturity model, initially for ITO but subsequently used in wider contexts. Wang (2011), for example, used and developed it further in the business process outsourcing (BPO) context. The model begins with a straightforward cost-driven phase ("cost stage") focusing strictly on the execution of contract-specified items. This is followed by the more mature "resource stage", where the vendor takes more responsibility for the outcome and the client uses more audit-type controls. Finally, in the "partnership stage", the client and vendor plan and develop the process together.

The Gottschalk-Solli-Sæther maturity model is applied in the present paper to study the development of outsourcing research in the two segments from the literature, covering the years of rapid growth of outsourcing in both MRO and ITO from 1991 to 2020. This is followed by and compared with recent developments analyzed on the basis of expert interviews carried out in 2014 and 2020 in the same segments.

In the MRO segment, the client is typically the operator of aircraft (military, airlines, or other). Setting up a separate, authority-approved organization for MRO purposes is costly. The fleet size, mix, and business model are among factors that drive the level and scope of MRO outsourcing (Bazargan, 2016; Holkeri, 2019; McFadden & Worrells, 2012).

The volume of MRO outsourcing among airlines was estimated by Aeroweb (2013) to be USD 50.9 billion in 2011 (expected to grow to USD 76.6 billion by 2021). Holkeri (2019) summarized the literature, showing that the trend of airlines' proportion of outsourcing in their MRO grew from approximately 30% in 1996 to approximately 68% in 2014.

According to Aeroweb (2013), the size of the global military MRO market was USD 65 billion in 2010. Between 2012 and 2015, the market remained flat, at approximately USD 62-63 billion. The military MRO market is viewed as approximately 20% larger than its airline equivalent but it is difficult to obtain clear figures regarding the outsourced proportion of development.

Willcocks, Lacity and Sauer (2017) summarized market research reports, noting that, by early 2014, the global outsourcing contracts for ITO and BPO exceeded USD 648 billion (USD 344 billion for ITO and USD 304 billion for BPO. According to Huang, Li, Liu and Xu (2021: page 1): "The global IT outsourcing (ITO) market was valued at USD 520.74 billion in 2019 with an estimated compound annual growth rate of 7.7% from 2020 to 2027". On average outsourcing accounted for some 10.6% of the total IT budgets in 2016 with this portion having grown to 13.6% in 2020 (Computer Economics, 2020)

According to KPMG (2018), defense and government sectors, followed by insurance, are the sectors that most utilize ITO and BPO. This KPMG study recorded that, in 2017, there were 727 signed and published ITO contracts exceeding USD 5 million in value, with a total value of USD 137.2 billion. In the same year, 167 BPO contracts totaling USD 30.6 billion were signed. At the same time, the average deal tenure increased, having exceeded five years in 2017 (KPMG, 2018). There is a remarkable difference in the figures provided by KPMG (2018) and Willcocks et al. (2017), but both indicate that the size of the ITO and BPO industry is extremely large.

Both MRO outsourcing and ITO have been researched in the 1990-2020 timeframe. They are today established and critical parts of the business strategies and operations in their respective client industries. Both segments seem to be still developing to cope with emerging challenges and opportunities; further, outsourcing can also be carried out only partially as it is possible to outsource only part of IT services or aviation technical services.

Against this backdrop, the present paper aims to address the following three research questions (RQs):

RQ1: Do MRO and ITO outsourcing developments follow the assumed maturity model?

RQ2: What are the commonalities and differences between these two industry segments in outsourcing development?

RQ3: What is the maturity stage of MRO and ITO today and what is the expected stage in the future?

2. Literature Review

Outsourcing is fundamentally a way to combine the resources of two or more companies to achieve a competitive advantage. Wang (2011) stressed the importance of looking at outsourcing from a relational point of view, as opposed to in a strictly contractual way. The rationale is that in any deeper form of cooperation, no contract can cover optimally the unknown upcoming issues, and the parties (vendor and client) base their interactions on the search for a superior joint advantage while simultaneously both achieving their own objectives through this joint effort. Akkermans, Van Oppen, Wynstra and Voss (2019) presented cases where key performance indicators (KPIs) were being successfully implemented in relation to both the vendor's and the client's performance, alongside joint target setting.

Lacity and Rottman (2008) described a learning curve for outsourcing (especially in ITO). It consists of four phases, starting with a "Hype and fear" phase, followed by a cost-focused "Pilots, first relationships" phase. Subsequently, renegotiating and vendor switching, together with quality and costs, become the focus in the "Relationships mature" phase. Finally, the "Institutionalized, reinvented" phase is focused on value-added.

Rai, Keil, Hornyak and Wüllenweber (2012) studied in detail the interactions of relational and contractual governance for BPO client satisfaction within the banking sector (which is the second largest buyer of outsourced services). They found that, in many cases, trust, information exchange, and conflict resolution substituted strict contractual mechanisms. Wang (2011) listed the elements of a quality outsourcing relationship as commitment, consensus, cultural compatibility, flexibility, interdependence, and trust.

According to Medina-Serrano, González-Ramirez, Gasco-Gasco and Llopis-Taverner (2020), in the usual make/buy decision criteria framework, the KPIs are grouped in different categories. Elements from their study

relevant to IT- and MRO-type service industries in the area of resources are: available resources/capabilities; skills; and know-how. Similarly, in the area of performance, the relevant elements are: conversion costs; contract cost reduction; delivery reliability; and sustainability. Elements relevant to ITO and MRO outsourcing decisions related to the potential for opportunism are: information asymmetry; flexibility; insufficient corporate social responsibility (CSR); and the complexity of the relationship.

Unlike most of the literature, which has examined outsourcing more as a direct transformation from in-house to full outsourcing, Elfring and Baven (1994) examined the development of outsourcing in knowledge-intensive areas in four stages: in-house development; selling services to third parties; spin-off of the unit in question; and full service from an outside vendor.

It seems that the general development trend in outsourcing, according to the literature, is to move from a strictly cost-minimizing focus towards a relationship that adds value to both the vendor and the client. There are more or less defined steps in this development, and the ways to describe these are often referred to as maturity models.

2.1. Maturity Models

Maturity models have been developed for many decades and they have become increasingly popular tools to place organizations on a specific stage in the development towards meeting the requirements deemed optimal in each context. There is no single, widely accepted definition of "maturity models", although Röglinger, Pöppelbuß and Becker (2012: page 329) have provided the following apt description: "Maturity models typically include a sequence of levels (or stages) that form an anticipated, desired, or logical path from an initial state to maturity."

Even though there are already hundreds of examples, literature exists concerning how to develop a new maturity model for a new application (see, for example, Becker, Knackstedt, & Pöppelbuß, 2009). Equally, there is a multitude of articles comparing and evaluating maturity models in specific contexts (Becker et al., 2009; Bititci, Garengo, Ates & Nudurupati, 2014; Correia, Carvalho, Azevedo & Govindan, 2017; Röglinger et al., 2012). According to Bititci et al. (2014), these comparisons, however, remain quite academic and do not assess the practical value and utility of the different maturity models. Becker et al. (2009) focused entirely on the model development process in the proposed eight spheres of evaluation. Salah, Paige and Cairns (2014) introduced a more practice-oriented template and an evaluation form for a maturity model based on expert evaluation. This template was used as a guideline to select a maturity model for the present study.

Frequently, maturity models are used in IT, including ITO, with many articles focusing on this area. Gottschalk and Solli-Sæther (2006) developed a clear model with three stages (cost stage, resource stage, and partnership stage). Garcia, Vicente and Aragonés (2013) developed a comprehensive model for IT service outsourcing, combining earlier models and applicable standards, while the model developed by Luong and Stevens (2015) is focused on long-term IT outsourcing success. The widely used Information Technology Infrastructure Library (ITIL) framework can also be regarded as a maturity model (Alojail & Corbitt, 2014). However, in the context of aviation, only a few studies have been undertaken; for example, Rierson (1998) examined software in civil aviation projects and Spiak (2012) examined quality culture. To the best of the author's knowledge, no previous adaptation of maturity models to the development of MRO outsourcing exists in the literature.

The model developed by Gottschalk and Solli-Sæther (2006) is adaptable to various industry segments as it is clear and straightforward. The characteristic focus areas of the cost stage of this model are: firm boundaries and a principal-agent relationship between the vendor and the client; clear and defined contracts; and a focus on economic benefits and transaction costs. In the next phase (the resource stage), the focus shifts to resource access (especially for strategic resources) linked to the parties' innovation, core competences, skills, and capabilities. Finally, in the partnership stage, the vendor and client form an alliance based on relational norms as well as economic and social exchanges, seeking also benefits for other stakeholders. The development from one stage to another is shown schematically in Figure 1.

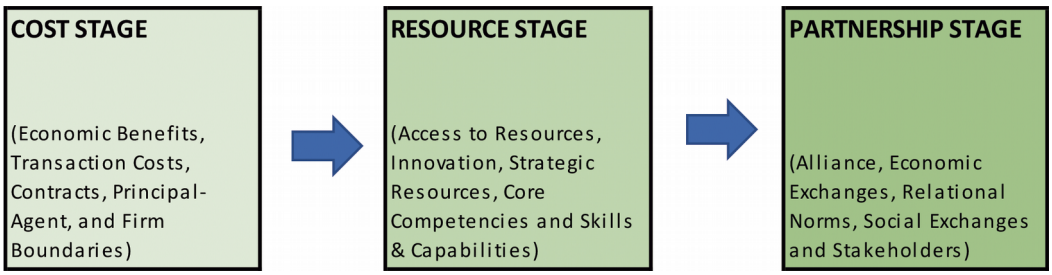


Figure 1. Maturity model (Gottschalk & Solli-Sæther, 2006)

2.2. MRO Outsourcing Development

Holkeri (2019) provided a literature review of aviation technical services' outsourcing from 1997 to 2016. There were considerably more articles on ITO than aviation MRO outsourcing, which naturally brings some uncertainty to the comparison between these two industry segments.

As single clear trend of themes' development is not easily found within the relatively few research articles about MRO outsourcing. It seems that research has continued to focus on items related to the cost stage (such as make/buy decisions) in Gottschalk and Solli-Sæther's (2006) maturity model, while also quickly expanding into the two later stages in the maturity level. For example, Bazargan (2016) and Hsu and Liou (2013) developed models for airline make/buy decisions belonging to the cost stage only half a decade ago, even though MRO outsourcing has been commonplace and growing in volume for decades (Holkeri, 2019). Issues such as the comparison between civil and military practices and offshore outsourcing from a cost point of view have preceded the overall make/buy decision criteria modeling as elements belonging to the cost stage.

Research related to the resource stage started to emerge in MRO from 2001, examining the market concentration and vendor selection process. For example, Demirtas (2013) discussed core competencies as the basis for strategic outsourcing decisions, which is clearly a resource-stage question. Safety is an extremely important subject in aviation and thus seems to be a continuous subject of research from 2006 onwards until the present day. This most likely is also a reason for a continued research focus on items related to resources and vendor quality.

Three articles between 2001 and 2005 discussed issues connected to the partnership stage, especially how to move from a contractual to a partnership approach. Since that time, this theme has not been revisited as a research focus in the MRO context.

2.3. ITO Development

Willcocks et al. (2017) considered the start of modern IT and business service outsourcing as the large 1989 deal made by Eastman Kodak, and academic research followed directly thereafter from the beginning of 1990s.

Liang et al. (2016) carried out a review on the research focus in ITO between 1992 and 2013. When its results are positioned relative to Gottschalk and Solli-Sæther's (2006) three-stage maturity model (cost, resource, partnership), the development seems to have followed this model well during the first 15 years.

From 1991 to 1995, the focus of ITO research was clearly on the items belonging to the cost stage, such as ITO motivations and the applicability of transaction cost theory (TCT), as well as ITO decisions and their risks. The ITO research focus from 1996 to 2000 on client-vendor relationships can be regarded to belonging still partly to the cost stage but also to the resource stage. Similarly, the research focus from 2001 to 2005 on the vendor's perspective and BPO can be regarded as covering both the resource and partnership stages.

More recent studies have, however, re-examined some of the previous research focuses connected to the first (cost) stage in the maturity model. From 2006 to 2010, the research focus shifted back to analyzing the effects of new phenomena, such as opensourcing, crowdsourcing, multisourcing, and offshore outsourcing, as well as an emergent need to study the fundamentals underpinning them (Liang et al., 2016). Willcocks et al. (2017) also predicted a number of disruptors impacting the traditional ITO scene, such as cloud vendors, cloud platform providers, and "software-as-a-service" approaches.

Isal, Pikarti, Hidayanto and Putra (2016) studied the impacts of different components in IT infrastructure flexibility and concluded that compatibility is the only one to provide a significant impact. According to Corbett (2004), the desired results of outsourcing need to be defined in clear, complete, and measurable terms, and the factors for the evaluation of the received proposals should be openly discussed, including their weights.

2.4. Summary of Outsourcing Development According to Literature

Overall, the longitudinal development of research focus both in ITO and MRO outsourcing is found to follow the logic of maturity models, but some areas from the earlier stages of maturity are still being studied in parallel with the emerging focus on areas with higher maturity.

Figures 2 and 3 show the development of the literature focus in relation to MRO outsourcing and ITO, respectively. The observed trend in MRO outsourcing research is a rather rapid development from the cost to the resource and partnership stages, while simultaneously continuing to studying the cost stage. In the ITO segment, the maturity develops rapidly, but then returns to the cost stage and seems to start a new cycle.

The research focus in MRO outsourcing and ITO has developed differently, and the existing literature does not provide a rationale for this. This paper aims to fill this gap by analyzing interviews presented later in this study. From a longitudinal perspective, the aim is to understand better these phenomena and also analyze how well industry practice has followed the focus in the literature.

One underlying reason for the difference may be that the aviation industry is extremely safety-critical, with high entry barriers and a lot of regulation, while the IT segment is characterized by constant innovations and disruptive new technologies.

	1991-95	1996-2000	2001-05	2006-10	2011-15	2016-20
PARTNERSHIP STAGE (Alliance, Economic Exchanges, Relational Norms, Social Exchanges and Stakeholders)			From contractual to partnership (3 articles)			
	1991-95	**1996-2000**	**2001-05**	**2006-10**	**2011-15**	**2016-20**
RESOURCE STAGE (Access to Resources, Innovation, Strategic Resources, Core Competencies and Skills & Capabilities)			Development of outsourcing market, concentration (3 articles)	Outsourcing and supplier selection process (3 articles) Safety in outsourced operations	Outsourcing and supplier selection process Safety in outsourced operations	Safety in outsourced operations
	1991-95	**1996-2000**	**2001-05**	**2006-10**	**2011-15**	**2016-20**
COST STAGE (Economic Benefits, Transaction Costs, Contracts, Principal-Agent, and Firm Boundaries)		Comparison of civil and military practices	Offshore outsourcing	Make/buy (2 articles)	Make/buy	Make/buy
	1991-95	**1996-2000**	**2001-05**	**2006-10**	**2011-15**	**2016-20**

Figure 2. Development of the MRO outsourcing research focus

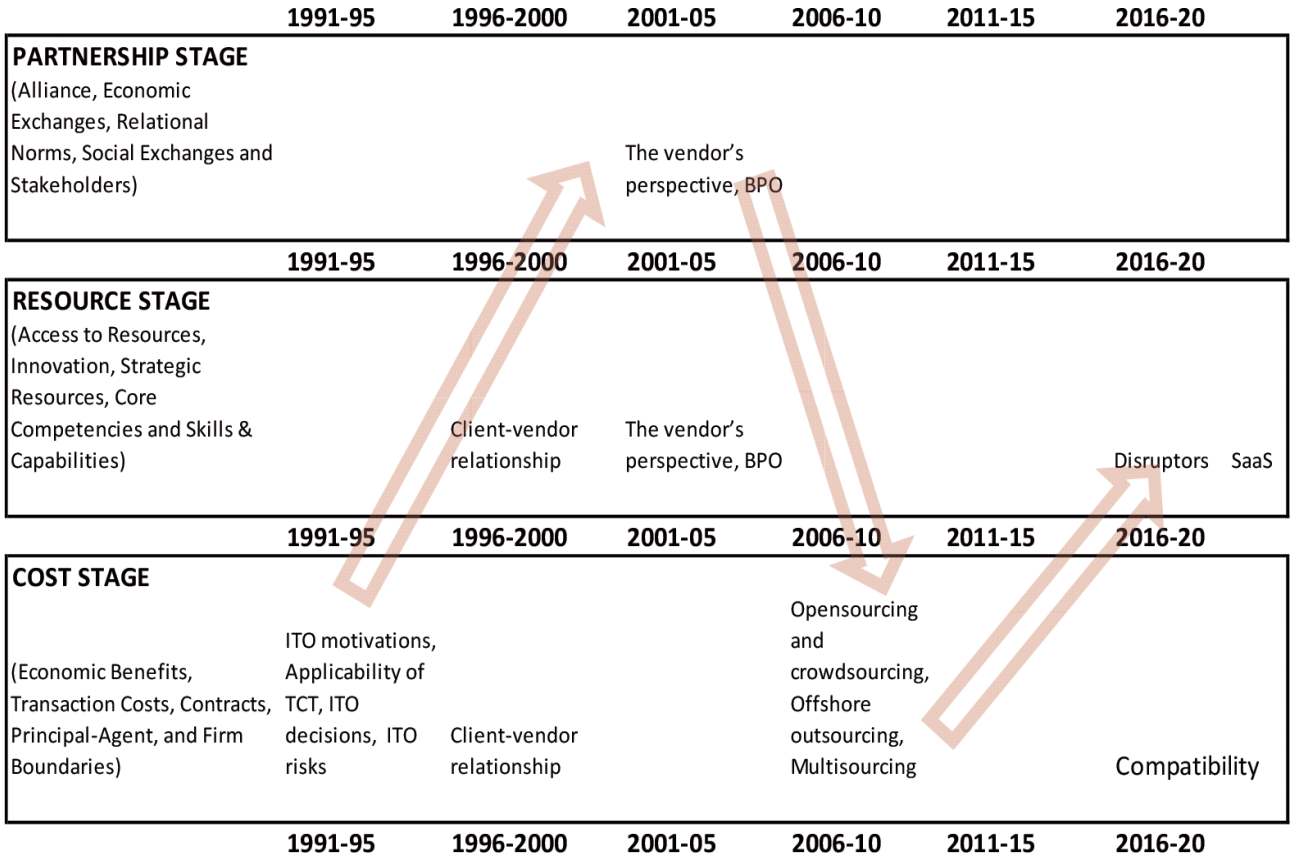


Figure 3. Development of ITO research focus

3. Research Methods

Maturity models have been applied widely in research on ITO and BPO. Usually, they have been used to define the status of an activity against the different stages in the model, but in the present study, this framework is used to study the development of outsourcing practices longitudinally within an industry segment. The model developed by Gottschalk and Solli-Sæther (2006) is a robust, clear, and rather straightforward model that can easily be used to study various industry segments. It was chosen as the model best suited for the purpose of this study. The previous section has already discussed the longitudinal development of MRO outsourcing and ITO research in relation to this maturity model and concluded that its focus areas have followed this model closely, which can be considered a further verification of the suitability of this model.

Deep expert interviews were used to gather empirical information and views for comparison with the literature analysis presented in the previous chapter. Hassett and Paavilainen-Mäntymäki (2013) stresses the importance of defining and justifying the chosen time period for a longitudinal study. In the case of outsourcing it is natural to base it on the typical duration of contracts, so that empirical experiences could be collected and compared between at least two contractual periods. As it has turned out that this varies between three and five years in ITO and between five and seven years in MRO, the chosen time period was set to six years in this study. Interviews were carried out in both segments, first in 2014 and then again in 2020 (to compare the findings with the earlier 2014 interviews).

Citing identified previous research, Hassett and Paavilainen-Mäntymäki (2013) concludes that in a longitudinal study data needs to be collected on one or more variables for two or more points in time. In the current interview study two points in time are used (2014 and 2020) with five variables (Scope of the outsourcing; Agreement duration and volume; Key success factors (KSFs); Clarity of the expectations and boundary conditions, both for clients and vendors; How the criteria and their weights will develop in the future). The same points in time and variables are used both for ITO and MRO.

3.1. Interviews

Interviewees were selected both from the MRO and ITO segments, representing senior executive levels from a wide selection of internationally operating actors. Most individuals were Finnish nationals, although one Swedish and one British individual were interviewed in the MRO segment. The selected individuals brought with them real case examples that were used as part of the interviews. The interviewees were in charge of, or closely connected to, these selected cases either from the client or vendor side.

The same individuals were interviewed in 2020 as in 2014 to as large an extent as possible, which was naturally somewhat challenging, given the longer time period (six years) of this longitudinal study. In ITO, this turned out to be very successful; even though some of the interviewees had changed positions, they were still working in roles very closely related to ITO. Four out of the original five interviewees participated. In the aviation segment, some of the original interviewees had unfortunately retired or moved to other industries between 2014 and 2020, resulting in two of the original population from the vendor side participating. However, three of the original respondents of 2014 were replaced by persons holding the same or equivalent senior-level client positions in 2020. These individuals were all already working for the same organizations and involved in pursuing the cases in 2014, but not yet in the senior positions at that time. Thus, it can be considered that any possible bias resulting from the change of these specific interviewees is only connected to personal opinions and does not result from lack of knowledge or facts. The effect of personal opinions was minimized as far as possible through the question setup. Most of the 2020 interviews were carried out using remote meetings due to the COVID-19 pandemic. Some of the respondents chose to answer in writing.

Respondents' profiles are shown in Tables 1 and 2 for the two segments.

Segment	2014 respondent	2020 respondent	2014 vs. 2020
Military aviation	Head of aviation sustainment (client)	Head of aviation sustainment (client)	Same position, different individual
Military aviation	Former head of aviation sustainment (client)		
Military aviation		Head of logistics organization (client)	
Military aviation	Head of MRO organization (vendor)		
Military aviation	Head of MRO organization (vendor)	Business development executive (vendor)	Same individual, different position
Military aviation	Head of MRO sales (vendor)	Head of MRO sales (vendor)	Same individual
Military aviation	Head of pilot training and MRO organization (vendor)		
Airlines	Head of technical department organization (client)	Head of technical department organization (client)	Same position, different individual
Airlines	Former head of technical department organization (client)		
Airlines	Head of operations (client)		
Airlines	Head of operations (client)		

Table 1. Respondents for the aviation MRO outsourcing interviews

The 2014 interviews were extremely comprehensive, both in the MRO and ITO areas, using long questionnaires and lasting for one to two hours each. In both segments, the interviewees consisted both of vendors and clients/operators and were structured around specific cases together with more general questions. In the aviation

MRO segment, there were six client representatives and four vendor representatives, representing the sub-segments of airlines, military helicopters, and military flight training. Due to the large number of interviewees and cases from different sub-segments, two interview rounds were carried out in the aviation MRO segment, using the Delphi method to ensure the correct summarizing of the collected answers. In the ITO segment, three individuals from the client side and two from the vendor side were interviewed in detail in one round in 2014.

The 2014 summaries were presented to the 2020 interviewees, and they were subsequently asked to comment on changes that had occurred. Most respondents chose also to describe the outsourcing environment of 2020 from a wider perspective, adding a lot of valuable information to this research.

Interviews were recorded and partially transcribed for later analysis. Written notes were also made during the interviews.

Segment	2014 respondent	2020 respondent	2014 vs. 2020
Industry (2014)/ communication (2020)	Chief Information Officer (client)	Vice President (vendor)	Same individual, different position
Industry	Chief Information Officer (client)	Chief Information Officer (client)	Same individual
IT solution provider	Country CEO (vendor)	CEO (vendor)	Same individual, different organization
Consultancy	Senior consultant	Senior consultant	Same individual, different organization
Industry	Chief Information Officer (client)		

Table 2. Respondents for the ITO interviews

3.2. Analysis of Results

The chosen research method could best be described as a Phenomenological Study where the focus is on the participants' perceptions of the event based on in-depth interviews. The summary of steps to carry out the phenomenological research provided by Groenewald (2004) was used as a baseline in this paper.

Observations were subsequently collected in tables to facilitate making conclusions and summaries following the guidelines of Groenewald (2004). In particular, quantitative data points were extracted from the answers (such as years of contract length and financial volumes in euros), key words were identified, and the answers were categorized based on whether they supported a concept or not. These summaries were then condensed to five, short descriptions, covering the areas of: the scope of the outsourcing; agreement duration and volume; key success factors (KSFs); whether the expectations and boundary conditions tended to be clear both to clients and vendors; and how vendor selection criteria and their weights will likely develop in the future.

The results of the interview analyses are presented for MRO outsourcing and ITO in Section 4. They are subsequently compared and discussed in Section 5 in relation to the research questions.

The maturity stages of MRO outsourcing and ITO practices in different times are assessed by analyzing the focus themes in the interviews, i.e. those issues considered most important, and other mentioned items compared to the descriptions of each maturity stage in the model.

4. Interview Findings

4.1. Findings from Interviews Consolidated

Table 3 summarizes the results of the 2014 and 2020 interviews both for MRO and ITO. Based on the summaries, the interview responses were assessed to indicate the level of maturity against the three stages of the maturity model (cost, resource, partnership) for each of the five areas addressed.

	Aviation MRO 2014 maturity	Aviation MRO 2020 maturity	ITO 2014 maturity	ITO 2020 maturity
Scope of the outsourcing	RESOURCE Deeper maintenance, repairs, and spare part logistics of a specific aircraft type are typically outsourced as they require special capabilities. Line maintenance directly connected to operations is usually kept in-house by the client.	RESOURCE/PARTNERSHIP Consolidation of vendor base. Criticality of some maintenance competence areas emphasized, leading to insourcing and deeper strategic partnering.	COST Infrastructure and related services are typically outsourced. Steering and applications are kept under the customer's control in-house.	RESOURCE Infrastructure still outsourced and new non-core areas added, such as application management, running, and even development and support of applications.
Agreement duration and volume	COST/PARTNERSHIP Five to seven years, sometimes partly including options, but often actually a commitment to 10 years or more. Several million USD.	PARTNERSHIP Long-term actual commitment beyond five, seven, or 10 years (including options) with flexible elements to cope with changes.	COST Start-up costs (infra, personnel takeover) result in a minimum contract length of typically three to five years. Volumes differ but are from millions to hundreds of millions (EUR). Customers are looking for more flexibility, scalability, and shorter contract times.	COST/RESOURCE Very few first timers to outsource IT (typically the 3rd or 4th round is already on-going). Diversification in contract times depending on whether the buyer is shopping for basic services, through competition, or looking for deeper partnering, including also strict performance criteria.
Key success factors (KSFs)	RESOURCE Vendor needs to be able to ensure the operational capability of the client. In practice, this can be measured by, for example, turnaround times and delivery capability. Costs need to be under control, taking in account also that part of the invoicing may be based on findings during the maintenance operation. The cultural match between the vendor and client is important and the client needs also to understand the outsourced activity well.	PARTNERSHIP Delivery capability, flexibility, mutual understanding, and efficiency of the whole process/supply chain, including original equipment manufacturer (OEM) relations.	COST Cost is main factor as this is often the driver for outsourcing. Uptime of outsourced infrastructure services is key to customer satisfaction. Time to solve problems and to tackle changes of different kinds is important.	COST/RESOURCE Cost and security of delivery still key, importance of response times is increasing. Competence of vendor, scalability, and ability to innovate have become important.
Clarity of the expectations and boundary conditions, both for clients and vendors	COST Big picture usually clear, but forming exact requirements is sometimes hard, especially if the client organization is fragmented or inexperienced.	COST Usually clear but communicating/understanding clients' aims may be difficult. Less experience in full capability outsourcing. New technologies and IT systems may cause issues.	COST Successful data collection for existing solutions and buyers' processes are critical in making things clear. Today, the market is mature and functions well. Changes and immature actors (both clients and vendors) may be difficult from the clarity perspective.	COST After several rounds, the market is even more mature and accurate. At the same time, the need for IT is growing, making cost-saving comparisons challenging.

	Aviation MRO 2014 maturity	Aviation MRO 2020 maturity	ITO 2014 maturity	ITO 2020 maturity
How the criteria and their weights will develop in the future	COST Price will be even more decisive than today. Soft values, like corporate social responsibility (CSR) may become important as well.	COST/PARTNERSHIP Price/total cost increases in important. Risk and data sharing and joint planning grow.	RESOURCE Microsoft and other global clouds are gaining more ground. User requirements are increasing, such as flexibility and scalability. Corporate social responsibility (CSR) requirements are becoming stronger, eg. taking care of personnel, environmental aspects, etc.	RESOURCE A lot of emerging technologies shape the future and pose challenges for their execution. Operations in the cloud are already an important reality. CSR is steered more by stricter regulation.

Table 3. Summary of the interview findings from the MRO and ITO segments

4.2. Aviation MRO Outsourcing 2014 vs. 2020

Based on the interview findings, the scope of aviation MRO outsourcing has evolved from a quest for specific resources and capabilities in 2014 to a strategic approach around critical areas in 2020, while the already long vendor-client relationships (in practice, 10 years or longer) have now been amended with flexible elements to cope with changes.

KSFs have remained basically the same, but in 2020 the focus was more on considering the whole process instead of just the performance of the selected vendor(s). New technologies and IT systems have emerged as clarity challenges, in addition to the occasional difficulties for the vendor in understanding deeply the needs of the client. Even though price was anticipated to continue to be the main future driver, the sharing of risks, data, and planning were anticipated to become more commonplace (clear elements of the partnership maturity stage).

The assessment of interview responses for the MRO outsourcing segment is shown in Table 4. Here, a clear shift in focus can be identified from the resource stage to the partnership stage in some of the key elements, especially KSFs, as well as in the agreement duration and volume. It should be noted that the expectations for the future are, however, still stressing the importance of elements of the cost stage.

A clear shift in thinking is seen in the MRO segment. While in 2014 the focus seemed to be finding complementary resources to perform tasks that the client (the aircraft operator) was not willing or able to do economically itself, the consolidation of the supplier base has led to deeper partnering in 2020. This is also reflected in the agreements, which are covering a longer period but contain more flexible elements, which is very much in line with literature findings regarding progression towards the partnership stage. KSF focus has shifted from the vendor fulfilling set requirements to understanding and optimizing the whole process and supply chain, including the roles of the original equipment manufacturers (OEMs). Contrary to the cumulative experience seen later in this paper within the ITO findings, the changing approach in MRO outsourcing still seems to pose challenges in communicating the requirements as clearly as would be optimal. Cost is anticipated to also dominate as a driver in the future, with the focus shifting, however, from simple price setting to total cost optimization.

The effects of insufficient clarity in requirements and data were also visible in the lessons learned of the general make/buy case study conducted by Medina-Serrano et al. (2020).

	2014	2020
PARTNERSHIP STAGE (Alliance, Economic Exchanges, Relational Norms, Social Exchanges and Stakeholders)		Scope Agreement KSF's
	2014	**2020**
RESOURCE STAGE (Access to Resources, Innovation, Strategic Resources, Core Competencies and Skills & Capabilities)	Scope Agreement KSF's	Scope Future
	2014	**2020**
COST STAGE (Economic Benefits, Transaction Costs, Contracts, Principal-Agent, and Firm Boundaries)	Agreement Clarity Future	Clarity Future
	2014	**2020**

Scope: scope of the outsourcing; Agreement: agreement duration and volume; KSFs: key success factors; Clarity: clarity of the expectations and boundary conditions, both for buyers and contractors; Future: how the criteria and their weights will develop in the future.

Table 4. Maturity assessments of the interview findings for MRO outsourcing

4.3. IT Outsourcing 2014 vs. 2020

According to the interviews, in 2014, ITO was predominantly dealing with outsourcing straightforward infrastructure services related to cost savings, but by 2020, management, development, and application support were also being considered for outsourcing. Thus, there seems to be a shift from the cost stage to resource stage in thinking. The same movement is seen also in the agreement durations and volumes, although with diversification observed.

The KSFs also support this development, with the addition of vendor competences and innovation ability in 2020. ITO is seen by the interviewees as a rather mature industry; clarity regarding client requirements does not generally seem to be a problem. Interestingly, even the shift to seeking innovativeness and other more complex and qualitative competences has not created any uncertainty in this area. Expectations were that the future would contain many new technologies, including cloud computing (which became an industry norm between 2014 and 2020), and issues typically found in the resource stage were emphasized

The distribution of the above assessments regarding the answer summaries between the three maturity stages in ITO is shown in Table 5, which clearly shows the partial movement from the cost to the resource stage between 2014 and 2020.

In line with the interview observations, Su, Levina, Ross, Lacity, Willcocks, Goo et al. (2016) noted that big IT outsourcing clients used to try to avoid lock-ins with their (usually few) big vendors by applying short contract lengths. Such short-term relationships did not, however, encourage innovations from vendors.

A shift in focus has occurred between 2014 and 2020 towards the resource stage, but none of the summaries yet indicate the IT outsourcing practice being in the partnership stage. Even answers to the question regarding future development still reside within the resource stage maturity level. When compared with the literature findings, where the partnership stage was very much the focus of research from 2001 to 2005, practices seem to be still quite

conservative. An interesting comparison can be made to the quite recent cases presented by Akkermans et al. (2019), where a new approach based on joint and interlinked KPIs between the client and vendor was needed after a complete failure of a more traditional set-up. It seems, according to the interviews, that this approach has not led to a breakthrough in the wider ITO practice.

	2014	2020
PARTNERSHIP STAGE (Alliance, Economic Exchanges, Relational Norms, Social Exchanges and Stakeholders)		
	2014	**2020**
RESOURCE STAGE (Access to Resources, Innovation, Strategic Resources, Core Competencies and Skills & Capabilities)	Future	Scope Agreement KSF's Future
	2014	**2020**
COST STAGE (Economic Benefits, Transaction Costs, Contracts, Principal-Agent, and Firm Boundaries)	Scope Agreement KSF's Clarity	Agreement KSF's Clarity
	2014	**2020**

Scope: scope of the outsourcing; Agreement: agreement duration and volume; KSFs: key success factors; Clarity: clarity of the expectations and boundary conditions, both for buyers and contractors; Future: how the criteria and their weights will develop in the future.

Table 5. Maturity assessments of the interview results for ITO

The scope of ITO has widened from infrastructure and related services to application management, development, and support. This is in line with the findings of the Computer Economics, (2020) study that concluded some 60% of companies already outsourcing at least some of their application development. As the segment has matured, clients are currently already executing their third or fourth round of a multi-year contract, having thus experience at their disposal. This is also reflected in the clarity of requirements, both for clients themselves and vendors. Cost, security of delivery (often measured by uptime), and vendors' ability to quickly react to challenges retain their position as KSFs. Innovativeness and scalability of the solutions seem to have gained ground, while new technologies (such as cloud computing) have entered the segment, along with their associated requirements. This is something that was also visible in the research focus in the literature analysis from 2006 to 2010.

These findings are also in line with those of Su et al (2016), who stated that the original aim of cost savings in ITO is today complemented by a need for innovation. This has a fundamental effect on how big companies choose their IT outsourcing vendors.

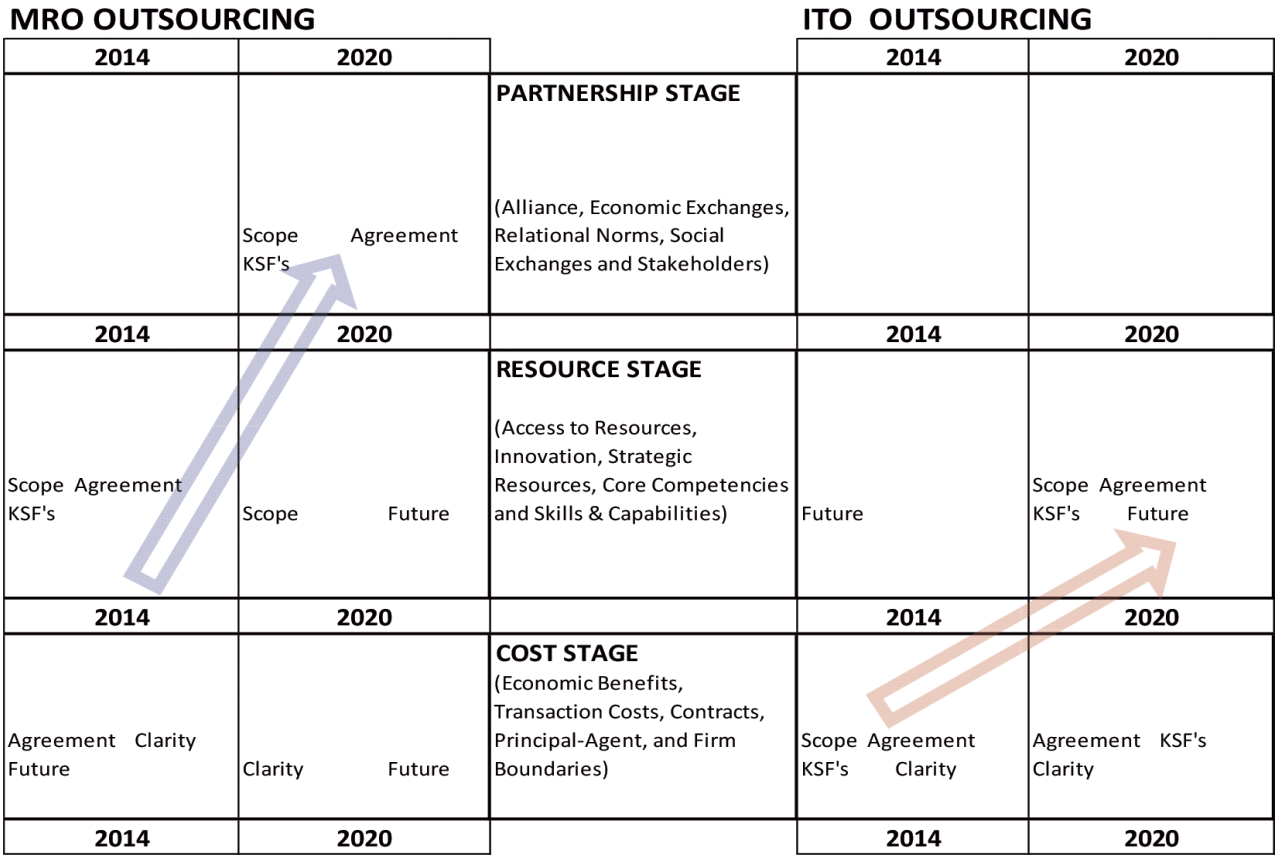
5. Discussion

MRO outsourcing development has been compared with ITO in this article using a specific maturity model. The literature summaries from two studies were complemented with other articles and assessed against the maturity model to understand the shifting of research focus longitudinally. Further, deep expert interviews were carried out, both for MRO and ITO segments in 2014 and 2020, and the results were compared with each other in both segments.

Both the literature focus and industry practice (as observed in the interviews) in the MRO and ITO segments seem to be moving from the cost to the resource to the partnership stage, in this order. Outsourcing research both in MRO and ITO segments follows the maturity model well, starting from the typical cost-stage questions regarding outsourcing motivation, general understanding of the phenomena, decision making, etc., during the 1990s. From the turn of the century until 2005, research focus turned rapidly to questions related to the resource and partnership stages. However, it was found that, when the focus develops from one stage to the next, research is still done in some areas related the previous stage. This is especially true in the MRO segment, with continuing interest in studying make/buy decisions. It is also worth noting that, in both segments, the focus of research identified as belonging to the partnership stage was followed by a return to less mature areas.

Interviews conducted in 2014 and 2020 support development in line with the maturity model. Although there seems to be some variation and divergence, the trends are clear.

Differences noted in the expert interviews, reflecting empirical cases, are interesting. Figure 4 combines Tables 4 and 5 and adds schematic arrows showing the trends identified in the interviews (2014 vs. 2020) in MRO and ITO.



Scope: scope of the outsourcing; Agreement: agreement duration and volume; KSFs: key success factors; Clarity: clarity of the expectations and boundary conditions, both for buyers and contractors; Future: how the criteria and their weights will develop in the future.

Figure 4. MRO and ITO interview results combined with schematic trend indications

When the interview results are compared to literature findings and summaries, it is noticeable that research is about 10 years ahead of practice, both in the MRO and ITO segments' maturity development. The ITO partnership peak in Figure 3 that schematically shows the ITO literature's focus development was not, however, identified at all in the interview findings.

It is a surprise that the maturity of MRO is developing faster and further compared to ITO. Both the starting point and development rate are more mature in MRO compared to ITO. Whereas in MRO there is a clear shift between

2014 and 2020 from a combination of cost- and resource-stage elements to primarily partnership-stage features, this is not the case in ITO, where the strict cost-stage approach of 2014 has only evolved to include some resource-stage elements in 2020. There is also an observable diversification in ITO, where both simple and more innovative outsourcing needs exist. Partnership elements seem to be missing in ITO.

Regarding the possible reasons for such differences in maturity between MRO and ITO segments, the interview responses from the MRO segment (see Table 3) highlight factors such as vendor capability to ensure the operations of the client, cultural match, the criticality of certain competence areas, and special capabilities. As the nature of aviation is highly safety-critical and regulated, these seem to be well matched with the quest for a long-term, trust- and competence-/resource-based cooperation.

On the other hand, in the ITO segment (see Table 3), the interviewees highlighted factors such as start-up costs, widening the outsourcing scope to new areas, flexibility, scalability, innovation, new technologies, and time to solve problems. The focus is clearly different than in the MRO segment and reflects the nature of ITO as technology-driven and open for new solutions with acceptable risks, combined with fast recovery. The current practice in ITO is also seemingly divided between the cost and resource stages. Both simpler forms of outsourcing infrastructure and related services, as well as outsourcing innovative development, seem to exist. New technologies and forms of doing business (such as the cloud) shape the future, create challenges, and are of significant interest.

The different nature of the two industry segments is shown in their different focus, which explains the differing development in outsourcing maturity. MRO is regulated and risk-averse, resulting in deepening partnerships and capability focus, while ITO is looking for innovative, scalable solutions to achieve the desired cost reductions.

Cost seems to be in focus regardless of other elements in the structuring of outsourcing and the selection of the applied solution, due to constant financial pressures. This is clear both from the literature and the expert interviews. In line with development in the partnership stage, the focus in MRO is more on the total cost of the complete value chain rather than just the price of a vendor's services.

The interviews continually stress the need for clarity in outsourcing set-ups, as well as when moving to more mature ways of working together, such as the partnership stage. This is somewhat contradictory to the suggestions of Rai et al. (2012), who stated that trust, information exchange, and efficient conflict resolutions can substitute contractual governance.

6. Conclusions

In this paper, the maturity model proposed by Gottschalk and Solli-Sæther (2006) has been applied successfully to compare a longitudinal development of outsourcing in aviation technical services (MRO) and IT. Developments in both follow the maturity model, but have their own, specific variations. Both are international large segments with a 30-year outsourcing tradition, and both are also using offshore sourcing. ITO has a much bigger and more varied base, both of clients and vendors, than MRO, and a basic assumption could be that it is clearly setting the trend in developing to higher maturity faster. However, this does not seem to be the case in practice, which is a clear contribution to the existing research, and an interesting subject for further studies.

This study contributes to research theory by using a maturity model in a longitudinal way, complementing the traditional approach of analyzing the static status of maturity development. Practical adaptations of the results can be found in the planning of outsourcing activities, and selection and management (both on vendor and client sides).

The interviews used in this research were mainly conducted with Finnish experts from internationally operating organizations. A possible resulting geographical bias exists, but is deemed limited, as practices in both studied segments are truly international. Further validation of the results could be achieved using a wider respondent pool answering a simpler questionnaire, instead of the deep interviews used in this study.

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