A MODEL FOR ADOPTION OF COMMON ALLIANCE PLATFORM IN AIRLINE:INTER-ORGANISATIONAL SYSTEMS AND HOME-REGION ORIENTATION APPROACH USING TOE FRAMEWORK

Don Dong Hyun LEE, William Yu Chung WANG
and Paul Tuck Ming LEONG
Auckland University of Technology, New Zealand
Corresponding Author: xgp9028@aut.ac.nz

Abstract

Airline services are now moving to the platform-based global connection. Common alliance platform (CAP), the shared infrastructure and software as the next generation reservation systems for global alliance airlines, has been spotlighted in the aviation sector since the early 2000s. Over recent years, in response to common initiative, emerging technologies, and standardised services, the alliance members have jointly implemented CAP, yet little is theoretically generalised about their adoption phenomenon in the contexts of Inter-organisational Systems (IOS) and Home-region Orientation (HRO) in particular. This research-in-progress paper proposes a modified Technology-Organisation-Environment (TOE) framework. Grounded in the key theories to IOS and HRO, the conceptual model comprises multiple TOE contextual elements explaining the CAP adoption at firm level, and supplement factors shaping HRO dimension. With a mixed-methods approach, a cross study will be conducted with 24 European and Asia-pacific carriers that belong to the airline alliances and have adopted a single CAP operated by a HRO vendor. By developing an original paradigm applicable to similar cases of platform-based IOS adoption in the HRO contexts, this exploratory research will contribute to filling the gaps in the knowledge of IOS adoption.

Keywords: Airline Reservation Systems, Common Alliance Platform, Innovation Adoption, Home-region Orientation, Inter-organisational Systems.

Introduction

Research in the airline services is still a minority area in the Information Systems (IS) discipline. Although air carriers are the most intensive IS users and their central applications play a crucial role as backbone IS for competitive advantage, relatively few academic contribution has been made [1,2,3]. The SCOPUS database lists 47,465 papers published in the area of *Social Science & Humanities* for the recent 20 years with "Information System" as a keyword. For the same period, abstract/title/keywords with "Airline Reservation Systems (ARS)" and "Computer Reservation Systems (CRS)[1]" occur only in twelve papers out of the 47,465 cases, representing less than 0.1 per cent of the IS related literature. In contrast, "Enterprise Resource Planning" and "Customer Relation Management" appear in 1,224 and 210 listings respectively.

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[1] The cases for the rail/hotel CRS research are excluded. Passenger Service Systems (PSS), differently named as either a meaning of next generation departure systems [3] or a particular type of in-flight entertainment systems in many literature, is also left out of consideration; the term, PSS has not been generalised by the academics for reasons of such a duplicity.
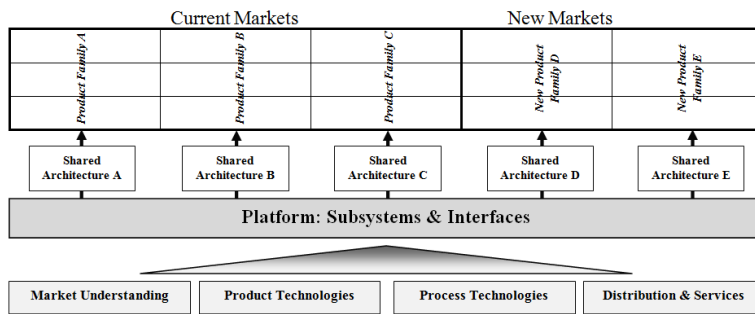
Figure 1: The Building Block Platform Framework

Since the late 1990s, network airlines worldwide have emulatively joined the global alliances (i.e., Star Alliance, Oneworld, and SkyTeam). By 2013, the airlines belonging to the three alliance groups transported over two-thirds of all international traffic [4]. In line with momentum for strategic collaboration, supporting common services and new requirements for the alliance members becomes an imperative for the IS providers [1,3]. In addition, among the alliance communities there has been a need for replacing the stand-alone, legacy-based ARS [3]. Common alliance platform (CAP) is developed as the next generation ARS in compliance with the functional specifications of global airline community [1]. In recent years, migrating to CAP has become an inevitable option for most alliance members accordingly.

Motivated by these issues, the paper aims to propose future research directions and identify contextual factors in the CAP adoption in the European region where the headquarters of the target CAP vendor is located and the Asia-pacific area. This article begins with reviewing the literature on platform and CAP. We then discuss the antecedents of Inter-organisational Systems adoption and Home-region Orientation, based on Transactional Cost Theory, Neo-institutional Theory, and the Technology-Organisation-Environment framework. A conceptual model is presented, followed by research question. Lastly, next steps are outlined.

Literature Review

Platform in Information Systems

Platform is defined as a shared architecture spanning physical products or non-physical services that are implemented with common subsystems and interfaces [5]. Platform in IS refers to a shared set of technical infrastructure and software. According to Institute of Electrical and Electronics Engineers [6], a platform has common technical features including reuse, flexibility, and efficiency that can substantially reduce time and cost, and increase the ease of system operations to its user. Figure 1 shows how this dimension fits a platform and markets, and theses technical components work as building blocks, which are configurable with market understanding, product/process technologies, distribution, and services in the construction [5]. The common architecture, subsystems, and interfaces on the platform can eventually serve for a firm's operation occurring in different business units and external organisations.

Common Alliance Platform

The CAP structure is grounded in Airline Reservation Systems (ARS). Leaming [7] and Christiannese [1] discussed the transformation of ARS into a platform setting. Since the first development in 1964, ARS has played a pivotal role as an electronic distributor in the airline industry [3,8]. In the 1990s, American ARS vendors suggested that ARS might evolve from a marketing facility for the American air carriers into *global informational platforms* working as platform-based ARS for the worldwide airlines [7]. The expansion of global airline alliances triggered the technological metamorphosis of ARS, because interoperability was indispensable between airlines that were parts of the same alliance [3]. With the global alliance emerging between ARS vendors and airline alliances, the issues of operating this

global platform thus became a critical topic [1]. At sunrise of the 20th century, ARS was renovated as *common alliance platform* by an alliance and its leading members (Figure 2).
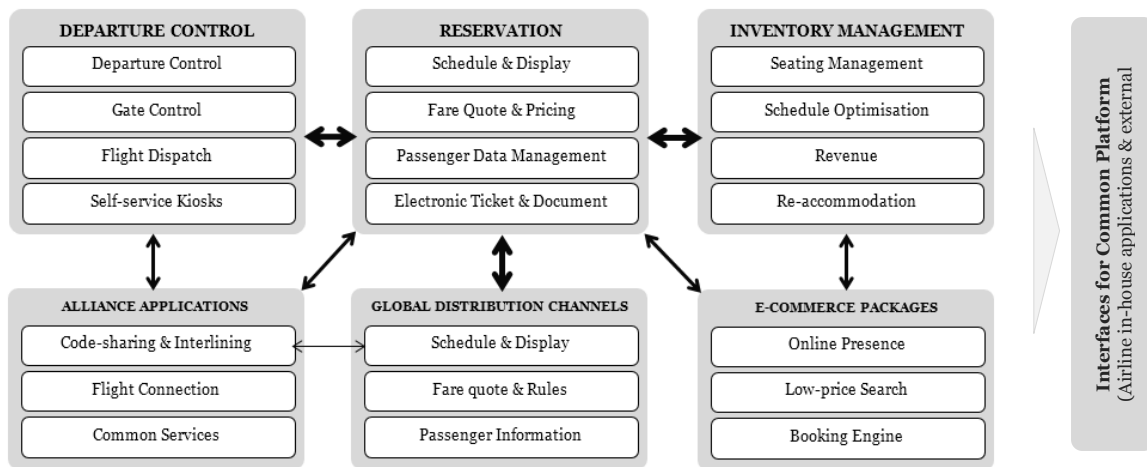
CAP allows the alliance member airlines to serve customers as a single component and harmonise customer data sharing as common proprietary [9]. The platform consists of many subsystems originated from the traditional ARS (i.e., reservation, inventory management, and departure control system) and the rest of peripheral subparts including distribution channels, alliance applications, and online selling packages [3]. In addition to the core components from ARS, the CAP's subsystems are designed to function as the aforementioned building blocks that facilitate an airline to cater for market demands and its business strategies. For the last years, many airlines have decided to migrate from their stand-alone legacy ARS to the open-ended CAP that enables them to share information with the strategic partners [3]. Nonetheless, academic studies handling the CAP platform in the airline industry are still scarce today [2,8].

Inter-organisational Systems

Given the nature of addressing inter-organisational information exchange, CAP (i.e., as the modernised form of ARS) is a type of IOS. For example, the literature has applied the IOS concept investigating as a model of competitiveness of ARS [10]. The term of IOS was firstly referred to as an automated information system in a set of standards shared by two or more organisations [11]. The role of IOS is enabling organisations to gain competitive advantage and improve the efficiency of their transactional functions, by transferring instantaneous computer-to-computer information [11,12]. Most IOSs are highly complex; they are subject to organisational constructions and network effects, and data ownership is shared [13,14].

IOS is an area in which numerous theories have been utilised [15]. For instance, Kurnia and Johnston [16] applied Transaction Cost Theory (TCT) and Neo-institutional Theory (NIT) to present the IOS adoption framework and predict the outcome of the theory-governed occurrences. Based on their theoretical models, major factors influencing IOS adoption are assembled by the following two external factors: (i) Industrial factors correspond to transaction risks, industry trends, strategic partners' readiness, customer needs, and market competition; (ii) Technological factors encompass operational efficiency, switching/ ⸺ ⸺ ⸺ ⸺ ⸺ ⸺ influence by one internal fa   Figure 2: Key Components of Common Platform (adapted from [3])   rocess innovation, financial resource, firm size, and top management commitment [15,16].

With the advance of technologies and the trends of globalisation, IOS has had a widespread adoption; it is electronically connected, open based, dependent on common technology capabilities, outsourced to the third party operators, and supports collaborating among

organisations in different countries [13]. Consequently, the task of adopting IOS becomes complicated, and identifying critical factors in the IOS adoption is essential [15,16].

Home-region Orientation and Relation to IOS

Home-region Orientation (HRO) refers to the tendency of multi-national enterprise (MNE) to concentrate activities in countries, which belong to the region of its headquarters [17]. In other words, HRO is the propensity of MNE to expand within its *home country and region.* Furthermore, in case an MNE's stakeholders (e.g., competitors, suppliers, or customers) are in the position of HRO, the MNE shows a stronger tendency toward its home-region [18]. According to [8,19], TCT and NIT are regarded as representative theories that interpret HRO. For instance, in reply to 'Why do MNEs tend to concentrate their activities in their home region?' TCT and NIT explain the grounds that their HRO tendency stems from; (i) the limited geographical reach of their firm specific advantages; and (ii) the liberalisation of business within regional trade agreements [19].

An MNE's tendency toward HRO can be also recapitulated in term of internal and external factors [18,19]. Internal factors refer to technologies, knowledge, innovative processes, managers' attitudes and market-/sales-related skills that are mainly firm's technological abilities to connect MNE's *firm-specific contexts.* External factors include institutional diversity, industrial characteristics, market differentiation, and social infrastructure that are used as *country-specific contexts* provided by foreign locations. Especially, HRO correlates with technological advantages (i.e., technology standards, demand for differentiation, and complexity of international management) and institutional diversity encompassing the variation in the regulatory, geographic, and socio-cultural streams [18].

Technology-Organisation-Environment

The previous literature demonstrates that the IS platform serves for a firm's operation occurring in different business units and external organisations such as the airline alliances. The extant research also theoretically specifies three factors affecting the IOS adoption at firm level (i.e., industrial, technological, and organisational contexts) and two factors explaining an MNE's HRO tendency (i.e. firm-specific and country-specific contexts). Those factors are grouped well with the contexts of the Technology-Organisation-Environment (TOE) framework (Figure 3). Particularly, TOE is useful to develop the models of modernised IOS adoption in a global context at firm level, in line with a three-step process: (i) decision-making on adoption, (ii) commitment to usage; and (iii) widespread use in the workplace [15,21].

TOE identifies the triad of a firm's context influencing the process by which is adopts. (i) Technological context refers to both the current and emerging technologies that are existing internally and available externally, relevant to the firm. (ii) Organisational context indicates the characteristics and resources about organisation as descriptive measures including managerial structure, communication
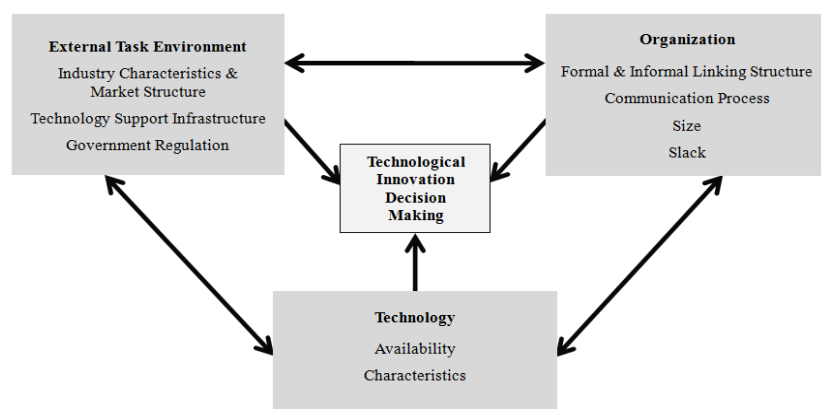

Figure 3: The TOE Framework (adapted from [23])

process, firm size, and resource slack. (iii) Environmental context describes industrial structure, regulatory environment, and stakeholder presence/absence [21,22,23].

A Conceptual Model

The strength of TOE in its ability to own a solid theoretical foundation and empirical support, however, it is advised that researchers and practitioners enrich TOE out of from the perspectives of a single focal organisation in a country [22]. Given the advice, to unveil the factors in adopting CAP that is outsourced by a multi-national vendor in the HRO position, this study develops an integrative model based on TOE. The conceptual model is developed by extending the TOE framework, synthesising the above discussion, and combining the researchers' industrial expertise at ARS/CAP and alliance practices (See Figure 4).
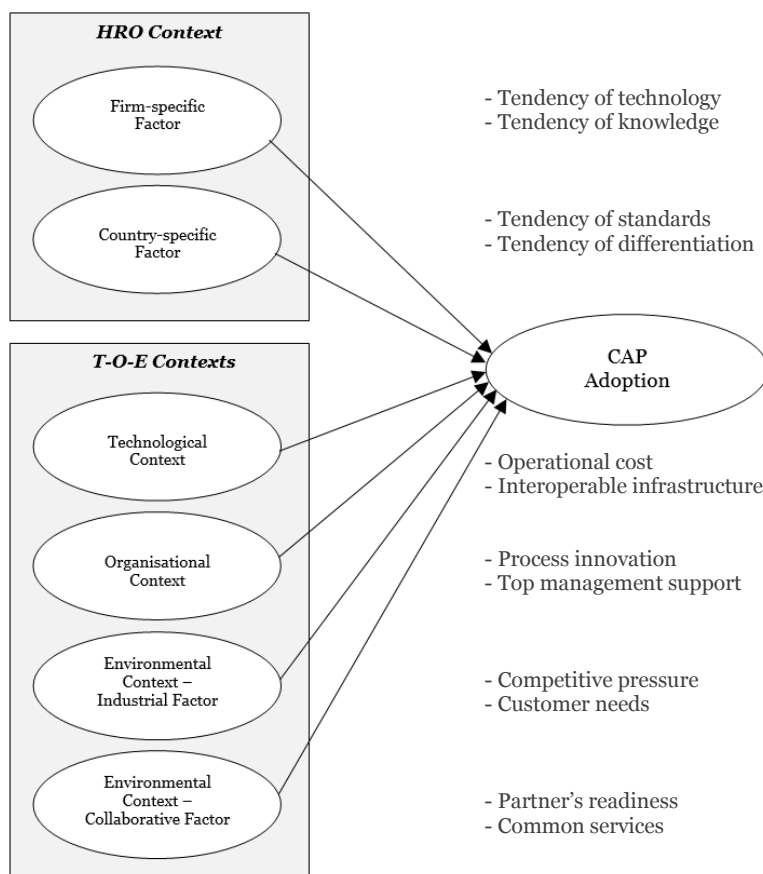

Figure 4: The Conceptual Research Model

The model specifies four sets of contexts; *Home-region Oriented Context* is added to the original TOE contexts to address the HRO tendency. Environmental Context is divided by two factor groups; *Industrial* and *Collaborative factors.* The latter factor group is intended to explain the specificity of collaboration with the alliance. The dependent variable for the research is *CAP Adoption* (i.e., decision-making on adoption, commitment to usage, and widespread use in. The independent variables for TOE context are chosen by referring to the antecedents of similar studies (e.g., open based IOS adoption in multilateral contexts by applying TOE, and the tendency for an MNE's competency to be home-region specific, etc.), which are published in the last ten years.

The independent variable elements are structured as follows: Technological Context includes (i) *Operational cost* [19,23,24] and (ii) *Interoperable infrastructure* [15,16]. Organisational Context comprises (i) *Process innovation* [19,23,25] and (ii) *Top management support* [15,23,24]. As two components of Environmental Context, Industrial Factor refers to (i) *Competitive pressure* [15,18,23,24] and (ii) *Customer needs* [16,19,23], while Collaborative Factor explains (i) *Partner's readiness* [23,25] and (ii) *Common services* [3,4]. Home-region Oriented Context is formed with Firm-specific Factor including (i) *Tendency of technology* [14,18,19] and (ii) *Tendency of knowledge* [18,19]; as well as Country-specific Factor with (i) *Tendency of standards* [18,19,26] and (ii) *Tendency of differentiation* [18,19]. Lastly, *Firm Size* (e.g., fleet size, or the number of workers) is defined as a control variable affecting Organisational and Environmental contexts [24,26].

Research Question

The key research questions are as follows: Which factors will influence CAP adoption in the alliance airlines? More specifically, (i) Will the CAP vender's home-region oriented characteristics act as opportunity or challenge?; and (ii) Will the airline's technological, organisational, and environmental contexts act positively or negatively?

Next Steps

This research is in the proposal stage. Current work is being done on refining the preliminary conceptual model. Future work should be narrower and deeper than the present article, which sought to more broadly explore and define the investigated factors. The upcoming article will also propose hypotheses, research methods, and data collection plan.

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