MANAGING BUSINESS PROCESSES IN AN ERP SYSTEM CONTEXT FOR AIRLINE CATERING LOGISTICS

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ABSTRACT

The logistics operation is one of the most critical components in the management of the supply chain within the airline catering business. Airline catering service providers have to manage increasingly complex logistics processes due to the competitive nature of the business. Enterprise resource planning systems (ERP) are the key enabler for the successful business process management in any organisation. It is important for embedding the process knowledge within the ERP application to achieve efficiency in all parts of the organisation. Yet, it is a crucial issue for airline catering companies to adopt and implement ERP systems. Therefore, we are motivated to perform analysis and design of airline catering logistics function for ERP system implementation. This paper discusses the three core processes of airline catering logistics function and supporting modeling methodology that enables successful ERP system design. Initially, we conducted analysis on airline catering logistics processes through direct observation and interviews with subject matter experts within the organization. Then we used the Signavio Process Manager, a process modeling tool to create standard business process models for the logistics functional area. This process landscape can be used as a reference for the implementation and can be published in web-based collaborative platform within the organization. Business users, management and IT experts can view the diagrams, discuss with their colleagues and make suggestions for improvements. Consequently, they can work on the process models together with the internal and external stakeholders to implement the system.

Keywords: Logistics Execution, Enterprise Resource Planning, Airline Catering, Process Map, Business Process Modeling

1. INTRODUCTION

Airline catering business provides inflight meals and catering handling services to airline customers. They need to manage the large volume of airline meals for all cabin classes along with crew meals from the kitchen to aircraft and the reverse flow of equipment and unused items, in a complex operational environment. In today's market environment, these industries are not only preparing those meals, but they are also responsible for the complete airline catering solution and provide supply chain and logistics services (Gschirr, 2010). They manage every element of the airline catering supply chain including menu planning, specification design, sourcing, supplier management, assembly operations, airport operations,

final mile delivery and returns management. It is possible to improve airline catering logistics service performance, increase airline's and passenger's satisfaction, reduce operational cost and improve catering service quality through standardisation of airline catering business processes and connecting all the logistics functions in the airline catering organisation electronically (O'Hara and Strugnell, 1997). Each operations manager and employee can get the latest update on any aspect of airline catering order such as flight information, passenger details and meal offering. This will enable the decision-making process faster based on real time information and will improve the capability of logistics service performance.

The purpose of this research is to analyse the logistics operations of a leading airline catering organisation in the U.K. in detail and understand whether the Enterprise Resource Planning (ERP) system can support the integration of its compartmentalised business processes into a synchronised logistics execution (Tsai *et al.*, 2010). This paper presents process architecture and mapping along with the process analysis and modeling of airline catering logistics service to implement full-scale ERP logistics functionalities for airline catering organisations to manage its increasingly complex logistics operations.

The following section reveals the background and related work on the advantage of ERP systems in managing business processes, challenges in ERP implementation and the complexity of airline catering logistics operations. To incorporate the business process management aspects in airline catering logistics operation, this paper introduces a process architecture and the concept of process mapping in the next section. In section 4, this paper explains the analysis of the airline catering logistics processes and illustrates the process models of three core processes of airline catering logistics operations for ERP system implementation. The last section concludes with the summary of the research work, discusses the proposed architecture and deliverables from the practical viewpoints, and outlines the limitations of the study along with the directions for future work.

2. BACKGROUND AND RELATED WORK

2.1 Enterprise Resource Planning Systems

ERP system is one of the integrated business information systems which enable organisations to integrate and control its business processes to gain a competitive advantage in the business environment (Madanhire and Mbohwa, 2016). ERP systems typically have more integrated functional modules. ERP applications in the market have a range of standard business processes designed based on the industry best practices. One of the advantages of using standard ERP systems is that enterprises can benefit from best practices. However, aligning standard ERP system function with the organisation's existing business processes has been recognised as one of the critical jobs in the ERP implementation (Botta-Genoulaz, Millet and Grabot, 2005). Every business organisations have their unique way of operating various functions. Therefore one standard ERP system will not fit for all organisations. There is always a gap between the system processes and the business processes in the organisation. To address this gap, organisations may need to customise the ERP system functionalities or redesign the current business processes or consider the combination of both options (Parthasarathy and Sharma, 2016). The organisations' business processes between different industries are hugely different. Customising an ERP system to meet the specific industry requirements are crucial tasks. Organisations use different implementation strategies to build their ERP system. In view of different implementation options, the common challenge encountered by the organisations is mapping their business processes correctly and logically to

guide the implementation of their ERP system. In recent years, many companies have used business process modeling as a powerful tool for demonstrating their business processes and designing the ERP system (Quiescenti *et al.*, 2006). Though the main implementation work of ERP system completed after the initial deployment, it really does not end. New software releases are regularly made available for implementation. Therefore, it's important to document the current processes within the system context for future evaluation to decide if the new software release should be deployed.

ERP system implementations are costly, but an important technology investment for business organisations. The businesses expect an immediate benefit after the implementation of ERP systems. Though most organisations usually receive the return on their ERP investment in the short term (Okrent and Vokurka, 2004), the advantage of ERP system is an ongoing process (Nwankpa, 2015), heavily depending on the level of usage and the post-implementation maintenance. The previous research in ERP system usage and benefits specifies that the technical support has significant influence in the ERP system usage. Due to the complexity of ERP systems, it's important for organisations to have adequate technical assistance to optimise the ERP system processes. Some of the benefits of ERP systems are improved performance, increased efficiency, flexibility, and cost saving. However, to get the maximum return on their investment, business organisations need to promote the maximum system usage among the users.

2.2 Airline Catering Logistics

Airline catering operations consist of 80% logistics activities and 20% cooking process (Chang and Jones, 2007). Airline catering organisations recognise that the onboard service experience is one of the key factors when passengers are choosing the airline for their travel (King, 2001). It's important for them to understand the catering requirements, main objectives, challenges and trends experienced by airline customer. This enables airline catering companies to develop solutions that add values to the customer and to improve their operational performance continually.

Airline catering supply chain is one of the complex operations systems in the world. Airline catering consists of a few major players; airlines, passengers, caterers, and suppliers. Due to the significant development in the airline catering industry, catering companies started facing more competition. Moreover, the growth of low-cost airlines tends to worsen this competitive situation. Airlines have become more aggressive in cost cutting. This substantial pressure on cost affects the catering providers' profit margin: their meal price and overall service cost (Pincus, 2001). They tend to subcontract the majority of their meal production activities to food manufacturers or meal suppliers. They started to see themselves more as a logistics service provider than a catering service provider. Both cost pressure and increased competition have led to a major change in the existing catering system (Figure 1). These two factors become the real motivation behind the catering outsourcing decision for airlines. Airlines wanted to focus on their core business. As outsourcing become a very popular option in the airline catering business, Global logistic service providers have started to realise the opportunities within the airline industry.

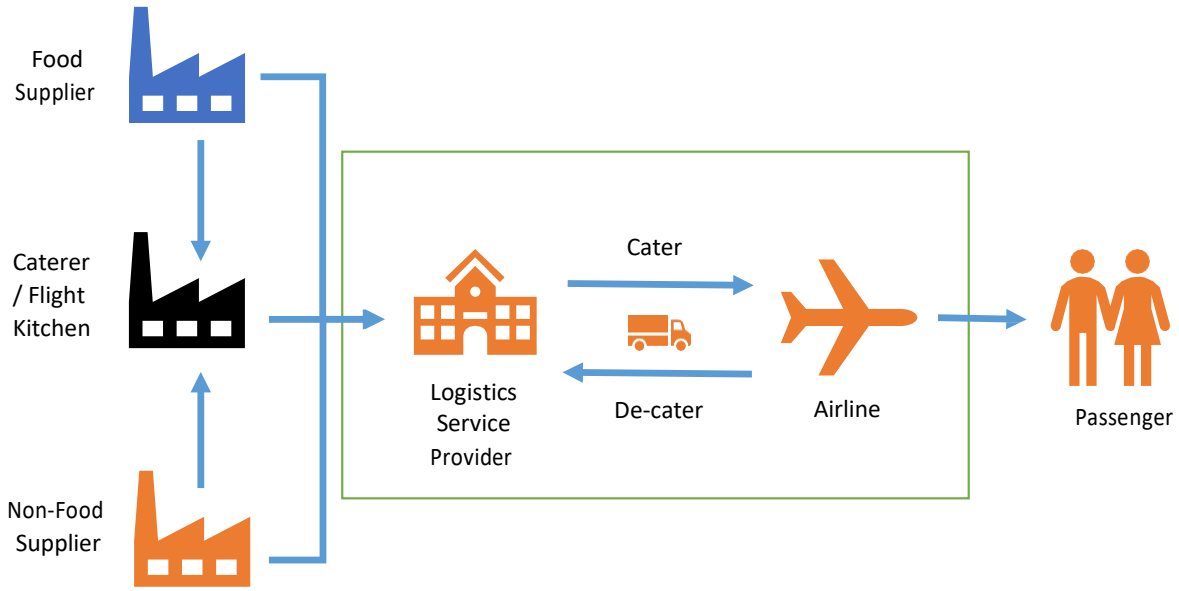

Figure 1. Airline Catering Supply Chain

These logistics companies become a lead logistics provider and offering a complete airline catering solution. They manage a significant part of the entire airline supply chain. They provide a range of solutions covering; planning and design, sourcing and supply management, assembly operations, airport operations, final mile delivery and returns management. These organisations work as airline's partner in streamlining the supply chain processes, and of transporting meals, beverages and catering equipments, implementing a lean and cost-effective airline catering operation. Accurately receiving the catering orders from Airline and efficiently processing them is the critical capability in the airline catering logistics operation (Jones, 2004).

As Logistics is an essential component of supply chain management, our research focuses on how logistics service can contribute to effective airline catering supply chain through business process integration. To understand what airlines, expect in terms of airline catering service and how logistics service providers can better design internal supply chain infrastructure in order to meet operational goals. To enable the Logistics service provider to achieve the ultimate goal of the airline catering service, which is to provide the right meal service to the right flight at the right time. It's important and essential to allow the business processes to interoperate. Business process integration will help logistics companies better perform primary functions within the value chain (Rajaratnam and Sunmola, 2020).

3. PROCESS ARCHITECTURE AND MAPPING

Process architecture is essentially a common and generally understandable view of all business processes that a company can carry out in order to provide a product or service to its customers and customers. In order to recognise the impact of ERP system implementation, it is important to have a clear map of business processes from beginning to end (Panayiotou *et al.*, 2015). Thus, the effect can be analysed and understood before it is rolled out. The organisational unit, responsible departments, roles, participants, IT systems and documents in

the business processes are usually identified in a process map. This is defined using a hierarchical approach (Okrent and Vokurka, 2004) and a perspective for the business process model that is understandable for everyone; Business users, management and IT experts.

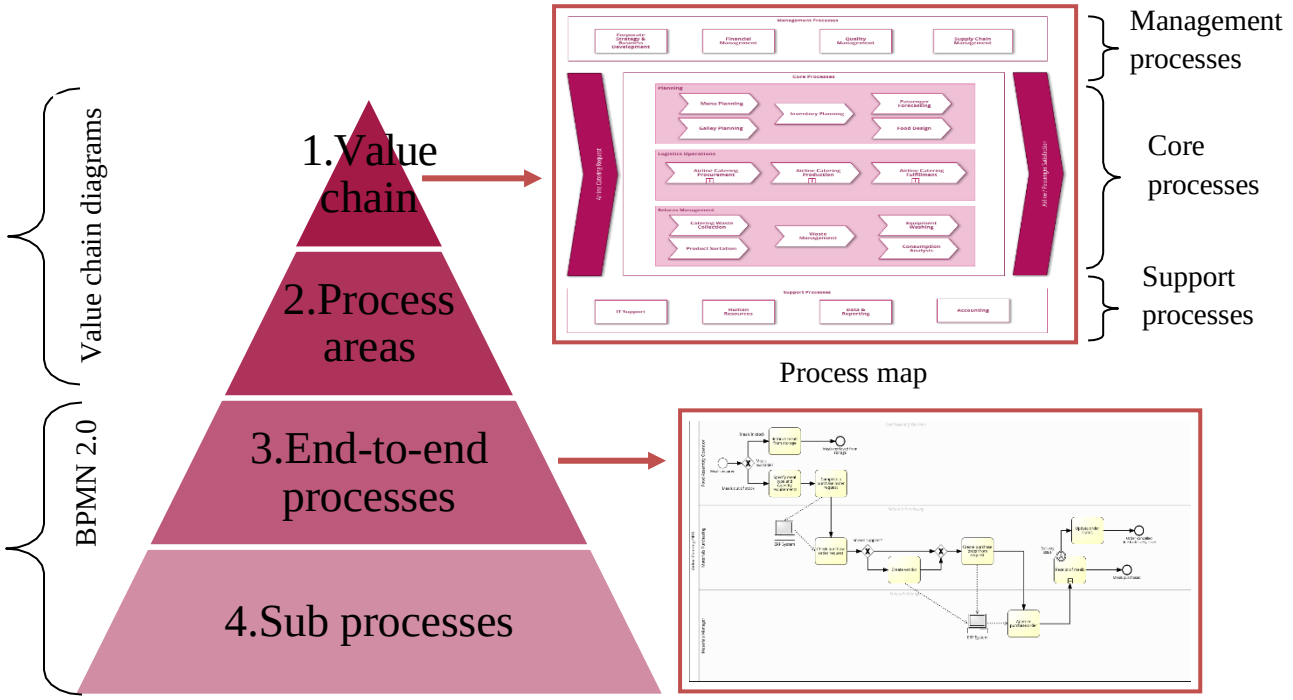

Figure 2. Process Architecture

In this research, Process mapping outlines each step of the workflow activities for the logistics functional area of an airline catering organisation. The airline catering logistics process architecture consists of 4 level hierarchy of processes in an airline catering organisation which are value chain, process areas, end to end processes and sub-processes as shown in Figure 2. Value chain and process areas are represented by value chain diagrams. End to end processes and sub-processes are documented using BPMN 2.0. We used the Signavio Process Manager to map each process levels and to model core processes of airline catering logistics function. BPMN is a graphical language that defines elements to model business processes and workflows (Polančič and Orban, 2019). Some of the core elements are start event, tasks, sequence flow, gateways and end event. Start event initiates the process scenario. Tasks are the activities which represent the individual steps of a process. Sequence flows are used to link every element within a process scenario. Gateways are used to control the flow of the process. End event denotes the end of the process (Khabbazi *et al.*, 2013).

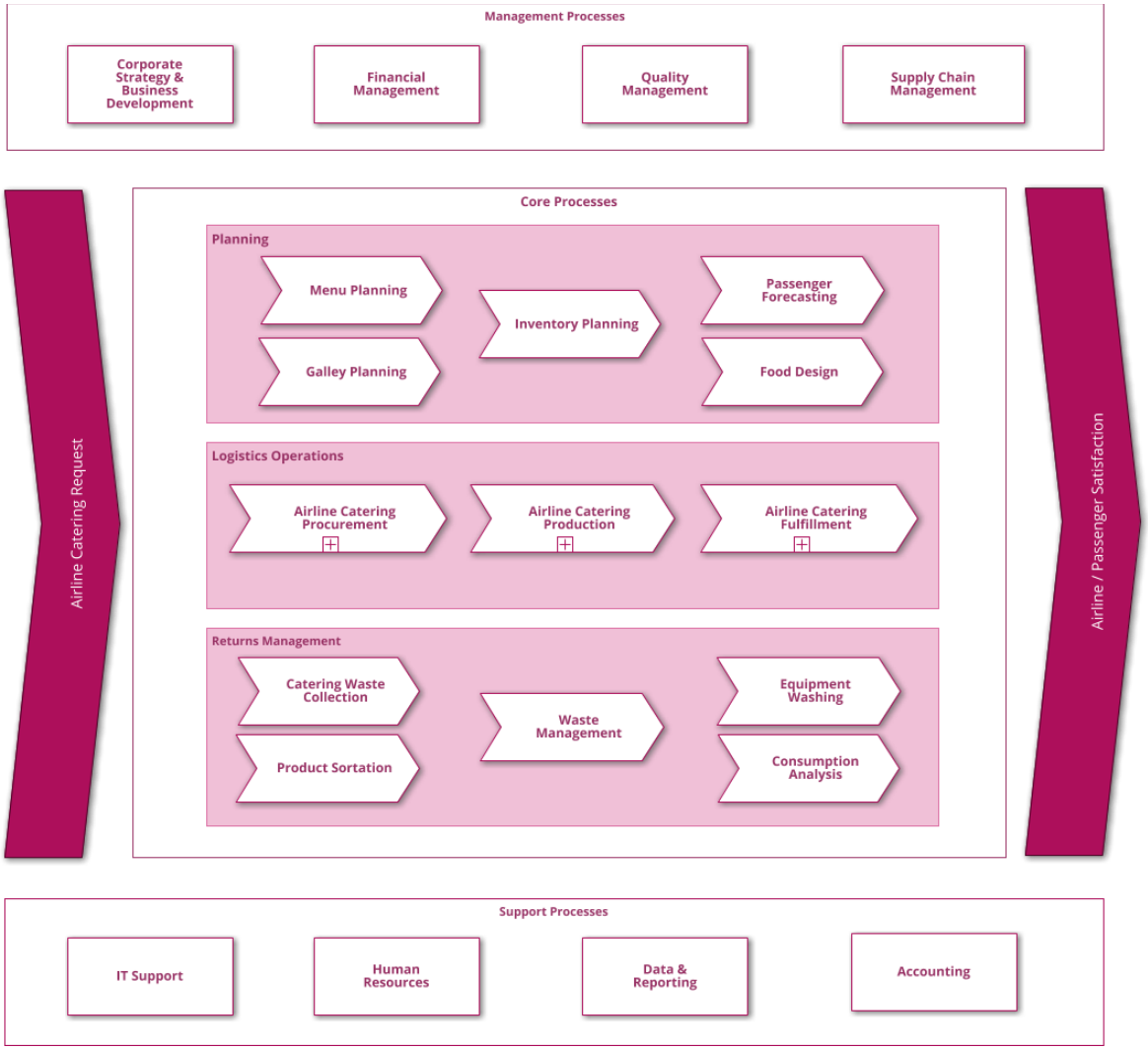

Figure 3. Process map of Airline Catering Organisation

4. PROCESS MODELING AND ANALYSIS

The organisation used in this case study as the basis of the process discussion is an airline catering company, specialises in providing logistics service. It has approximately 2000 employees at their service centres and operates 24 hours a day, 7 days a week. The company provides catering and catering handling services to different airline customers with daily flight operation of about 350 flights a day. It offers a variety of services from procurement, product sourcing, tray and trolley assembly, food and beverage replenishment and final distribution to aircraft as well as a full wash up service of airline catering equipment.

According to the way this case study considered the implementation of the airline catering logistics operation in an ERP context, there are three core business processes (Figure 3) : airline catering procurement (source); airline catering production (make); and airline catering fulfilment (deliver).

4.1 Airline Catering Procurement – Source

Airline catering procurement includes functions associated with purchasing of, and pay for, all meals, food and non-food materials required by the airline order fulfilment process. There is one key variant to this core business process: supplier managed inventory of airline's own stock where the procurement is a predefined agreement for airlines to automatically send the airline catering company with the specific catering products and components under certain conditions that triggered by average daily consumption and current stock level.

The procurement business process covers all aspects of procuring meals and non-food item to stock. This includes activities such as raising a purchase order request, creating purchase orders, purchase order approval, receipt of items, and invoice verification (Figure 4).

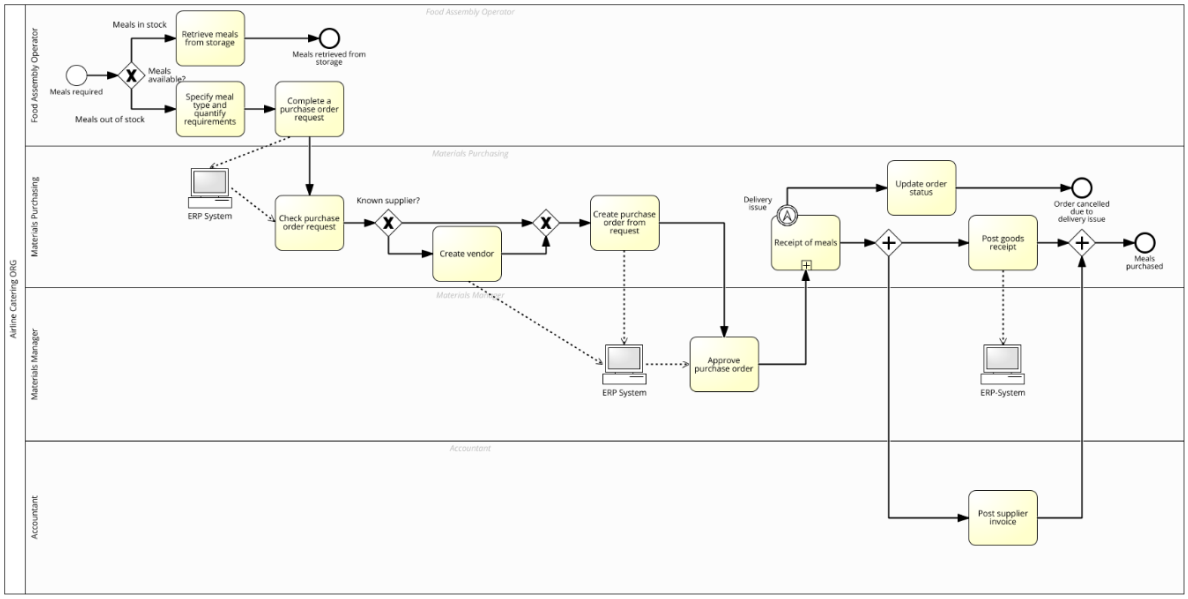

Figure 4. Airline catering procurement business process

4.2 Airline Catering Production – Make

Airline catering production begins with the receipt of airline catering orders and ends with catering consignment packed for final mile delivery to the aircraft as demonstrated in Figure 5. The main production method studied in this research to complete the production of different catering containers of in-flight products is assembly operation. In this method, catering containers are made and put into inventory prior to the catering order from the airline is processed. The demand management procedures need to be defined to determine the appropriate production strategies that suit the airline catering company's business requirements best. Using the flight schedules and the forecast passenger demand, airline catering organisation can plan for a periodic meals demand (Hovora, 2001). The actual airline orders are then be covered by this produced in-flight stock and procured materials. This allows operatives to make in-flight products as required and to replenish the catering containers in inventory. Airline catering production process covers all aspects of assembly operations from materials planning, through production planning, to quality check, confirmation and inventory posting.

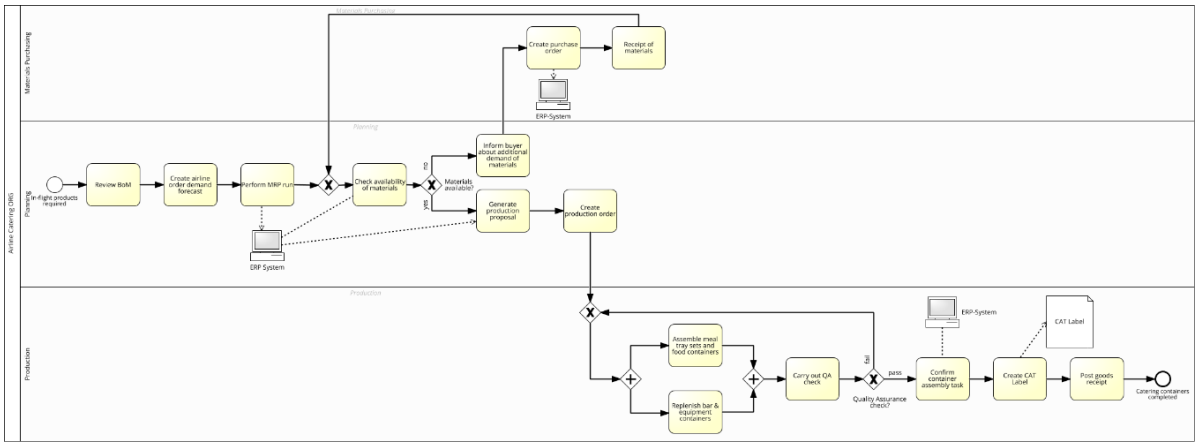

Figure 5. Airline catering production business process

4.3 Airline Catering Fulfilment – Deliver

Airline catering fulfilment includes the steps required to complete the in-flight catering service. The following main steps are included in this process which can be seen in Figure 6.

- begin with the determination of specified service offering with meal types
- apply the suitable galley plan, and packing list to airline order for consignment delivery to the aircraft
- settle with the airline payment for these catering products and services

This business process enables an airline catering company to efficiently deliver in-flight catering products directly from the service centre to aircraft to meet airline demand. Airline catering fulfilment process involves numerous business activities – from airline order, catering service determination and galley plan allocation, inventory management, to catering consignment delivery and customer invoice creation.

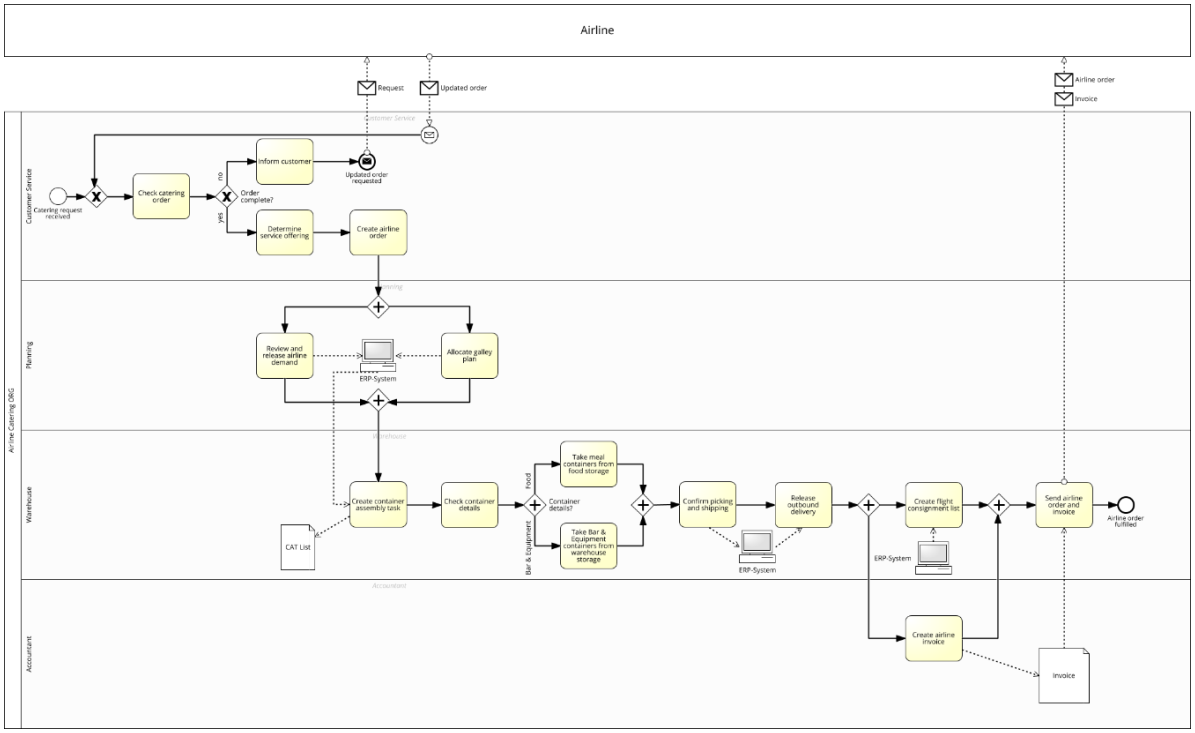

Figure 6. Airline catering fulfilment business process

5. CONCLUSION

In the competitive environment of the global market, effective design of an ERP system has been recognised as the main factor of competitiveness and success for logistics and supply chain operations in most organisations. The case study described in this paper selected three core processes of logistics function in an airline catering company to focus on for a successful business process management with the ERP system.

The three logistics processes studied in the airline catering organisation were: airline catering procurement, airline catering production, and airline catering fulfilment. These airline catering logistics process models can be adapted to any organisations in the airline catering business environment. Besides, it identifies business processes in airline catering logistics that can be compatible with the ERP systems as an ERP system should enable the airline catering organisation to work more efficiently. Thus, it can be used as a guideline for airline catering organisations who are looking to invest in ERP systems. Furthermore, the proposed process architecture and business process modeling diagrams can be used as a reference for the configuration. This research study aims to support business processes integration of the airline catering organisation, particularly to enable the logistics execution to become more effective by designing its core processes within an ERP system context.

The limitation of this design is its industry adaptability and suitability that have not been assessed yet. It's restricted to the business process modeling only, based on a case study of an airline catering service provider in the U.K. As there is no direct implementation of the logistics execution system from the proposed business process models, it is necessary to evaluate the applicability of the model through future research. Further research for a wide assessment to many airline catering companies can be performed in order to validate that the design is standardised and is being adaptable in the airline catering industry. Lastly, this study only focuses on logistics operations for this research, and we recommend further research on other functional areas of the airline catering company such as airline catering equipment management, galley and stowage planning, human resource management, finance, etc.

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