Chapter 3

Theoretical Basis for Managing Complexity

3.1 Introduction

Previous chapter presented current literature in the area of revenue management and methods of negotiation between autonomous entities. Finally, the problem was focused as revenue management in complex businesses still being a challenge. This chapter presents findings to form a technological basis to model a solution for revenue management.

3.2 Multi agent technology and business process complexity

In the previous chapter it was introduced why revenue management is still not addressed in fully autonomous manner. That is, due to the complex nature of the business process. Tour operation with hotels and flights only still faces huge amount challenges when it comes to the online market. Flight and accommodation prices face a greater competition because users in different market segments tend to find the best offers available before booking something. Traditional techniques in modeling the complexity like ordinary software have somewhat catered the need of managing revenues but not up to the full extent. Software systems need to be continuously reconfigured in-terms of pricing and inventory protection levels which has become a burden to the management and the users of the system.

An in-detail study about building complex software systems using agent-based approaches presented by N.R. Jennings[11]. In his publication, he has first pointed out what complex software is and according to him software for business process management also falls in that. In managing complexity of a software system, Jennings has identified number of points. Those include the facts like, complex systems having hierarchies, hierarchical system evolving faster and possibility to identify the interactions between subsystems of hierarchies. In managing above mentioned complexity software engineers do three main tasks, namely, decomposition, abstraction and organization. Also, two key quantitative differences in software

engineering paradigms and agent paradigms identified. First is, agent oriented interactions occur through a high-level agent communication language and the second is, agents being flexible problem solvers. Through the above points, Jennings arrive at a point where he says, it is futile to try and predict or analyze all the possibilities at design time and it is more realistic to make the component interact and make decisions at the runtime. Finally, Jennings presents important criteria for adopting agent oriented techniques widely. First is, the degree to which agents present a radical departure from the current software engineering thinking. Second is how feasible it is to integrate existing software with agents. It can be seen that, Jennings has been built a fair justification why agent oriented approach well suits for building complex software systems.

Further, there are number of other efforts in trying to model tour operation or online hotel and flight reservation systems using multi agent technology. The problem of developing an agent mediated ecommerce application to automate the hotel reservation presented by Oguz et al [15]. Kai Yang et al [3] have studied and presented an approach to create a common market place for accommodation industry by integrating different existing applications and systems. Even though above mentioned approaches are on multi agent technology, they are focused specific scenarios like identifying different entities, building Ontology and integrating different reservation systems. However in general, all the current work proposes that, multi agent technology is the technology suited to model complexity in software systems.

It is evident from the literature that, multi agent technology is the most suitable technology to model the complexity in tour operation business process but not restricting to that, to model any complex system. Hence, to address the problem of managing revenues in adaptive manner, multi agent technology has been selected.

3.3 Summary

In this chapter it was presented, current technologies available to model complexity in business processes management software. From the literature it is found that, multi agent technology is the most appropriate technology to address the complexity in such

systems. Hence it is concluded that, multi agent technology can be used to build a model to tour operation business process and to earn greater revenues resolving complexities arise in the market. Next, the chapter with approach presented. In that, details on inputs, outputs, process, users and features of the proposed system is presented.