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Rong-Rong Chen
Chang Gung University, M9144008@gmail.com

Yung-Hsiu Lin
Chang Gung University, lin021060@gmail.com

Ta-Wei Shih
Chang Gung University, dawei@mail.cgu.edu.tw

Her-Kun Chang
Chang Gung University, hkchang@mail.cgu.edu.tw

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SUPPORTING SERVICE MANAGEMENT WITH SERVICE ENCOUNTERS ANALYSIS: A CASE ON CALL CENTRE OUTSOURCING OPERATIONS

Rong-Rong Chen, College of Management, Chang Gung University, Tao-Yuan, Taiwan, R.O.C., M9144008@gmail.com

Yung-Hsiu Lin, College of Management, Chang Gung University, Tao-Yuan, Taiwan, R.O.C., lin021060@gmail.com

Ta-Wei Shih, College of Management, Chang Gung University, Tao-Yuan, Taiwan, R.O.C., dawei@mail.cgu.edu.tw

Her-Kun Chang, Department of Information Management, Chang Gung University, Tao-Yuan, Taiwan, R.O.C., hkchang@mail.cgu.edu.tw

Abstract

Background. A service encounter is the moment that a client directly interacts with a service firm. It is a social-oriented activity that an in-depth analysis of how the client behaved can contribute to the service quality.

Objective. The primary objective of this study was to cluster the CLT into groups. The secondary objective was to discover the sequence of question types that asked in each group.

Method. A real world call centre outsourcing practice and data mining techniques are used to discover client behaviour.

Results. A total of 100,703 inbound calls from the call centre operational database are analyzed. 90.4% of the total calls were made by 85% of clients who used up to three business applications. 72.03% of the total calls were made by a group of clients who involved two to five question types. The clients were clustered into four groups by three behaviour variables. The sequences discovered in this study were mainly on two question types.

Conclusion. The service encounter is a complex business process that an integrated perspective should be taken to analyze the dynamics among the entities involved. The client behaviour can be discovered and used as the feedback information for turning the operations in different organizational levels.

Keywords: Service Encounter, Call Centre Outsourcing, Data Mining, Customer Behaviour

1   INTRODUCTION

A service encounter implies customers interacting directly with a service firm (Shostack 1987). Such an encounter has a deterministic effect on customer satisfaction (Bitner 1990), and how to effectively handle this moment of truth has attracted a great deal of managerial concerns (Solomon et al. 1985, Grove et al. 1998, Bitner et al. 2000, Laing and Hogg 2008). Every service encounter is unique due to the variation of customers' environmental situations (O'Sullivan et al. 2003). It is thus difficult to provide service employees with detailed guidance on how to conduct interactions correctly. However, service encounters entail certain behaviour protocols that each participant should enact in order for the interaction to advance smoothly (Solomon et al. 1985). Therefore, these behaviour protocols can have implications on how a service encounter should be supported and what actions the service firm should take to maintain the expected quality. This study introduces a service encounter support (SES) model to describe the context of a call centre outsourcing (CCO) service (Robinson and Morley 2006, Hasija et al. 2008, Holman et al. 2007) and uses the model to analyse customer behaviour within the CCO service in question.

Data mining is a data analysis technique used to search for relationships and customer behaviour within large datasets (Han and Kamber 2006). Comprising of traditional statistical methods, most data mining algorithms can support the analysis of a voluminous dataset without statistical assumptions (Giudici 2003). Data mining techniques are used to study customer behaviour in the serviced system (Carvalho and Ferreira 2001, Paprzycki et al. 2004). We can deepen our understanding of the customer service problems by discovering customer behaviour before identifying the real causal relationship (Paprzycki et al. 2004, Van Der Aalst et al. 2007). A typical data mining technique can involve data transferring from original datasets, cleaning up data to remove errors, checking for data consistency, and formatting data to accommodate for specific data mining software (Lee and Siau 2001). The details of the mining algorithms are out of scope of this study, although references are provided (Han et al. 2004, Han and Kamber 2006). In a practical mining operation, the main challenges can be the interpretations of the results from the mining operations and how to apply said results toward further business improvement.

This study focused on customer behaviour while the CLT interacted with AGT. The primary objective of this study was to cluster the customer into groups. The secondary objective was to discover sequence information that could be used to distinguish the question types asked in each group. After this introduction, a brief literature review is provided regarding to the nature of the service, the systemic approach, and the data mining techniques. Thereafter, the research setting will be specified, including the call centre's background, and field research activities in this study. This article depicts the SES modelling processes and the results of customer behaviour discovered from the service encounters within one year period. We then discuss our findings and managerial implications with a conclusion remark.

2   LITERATURE REVIEWS

A service encounter is defined as a period of time during which a customer directly interacts with a service firm (Shostack 1987). It is a dynamic and evolutionary development that both the customer and the service employee reinterpret the messages received and adjust their responses accordingly (Solomon et al. 1985). A service encounter can be modelled through a process-oriented approach (Lovelock and Wirtz 1996), such as a service blueprint or structural alternative, to characterize the complexity and divergence of the interaction (Shostack 1987). Alternatively, it can be described with scripting techniques so that managers can provide scripted dialogues for front-line employees to interact with customers. These service encounter support methods can provide structured guidance for employees to follow when certain service conditions are met. However, each service encounter can be different due to various situations of customers and their processes as they move forward through the services. It is thus difficult to predict this process in advance and to design a detailed service delivery

procedure for front-line employees to follow (Rychkova et al. 2008). Moreover, each service encounter is not only conducted by front-line employees, but is also supported by different departments in the service firm (Spohrer et al. 2007). This dynamic process driven by external conditions and complicated by internal coordination efforts makes service encounters supporting a complex task. Hence, this task requires a systemic approach to tackle the service as a whole (Lovelock and Wirtz 1996) and needs a conceptual model to describe the managerial situations in various details (Spohrer et al. 2008).

A systemic approach is an analytical method drawn from General System Theory (Von Bertalanffy and Sutherland 1974) that has been used by system analysts to gain insights about complex situations. It aims to build a conceptual representation to describe certain managerial situations and use the representation to identify problems and design alternative solutions (Itzhak 1987). A systemic approach has the ability to describe a system in a hierarchical architecture in order to achieve different levels of detail about the system (Capra 1996, Simon 1996). Researchers have suggested a three-level hierarchical architecture that can be used to describe such an evolving system (Capra 1996).

- The first is pattern level, describes the system's essential characteristics, configuration of system entities, and the relationships among them.
- Next is the structure level, depicts the specific entities and how they are designed and implemented in their physical embodiment.
- The last is the process level, illustrates the activities conducted by the entities as they handle the input, processing procedures as directed, and delivering the expected output and results.

The nature of a service can be viewed as an open system that evolves as it interacts with the service environment (Lovelock 1992). When studying a service system, the process level can be used to describe the service encounter of a service firm, including interactions between customers and service employees (Solomon et al. 1985). Vast amounts of data are accumulated through these interactions. The data should be used as feedback information to augment the capabilities of service employees and used as a map to adjust the firm's evolutionary path (Ograjen ek 2003, Chan 2005).

3 RESEARCH SETTING

We studied a real-world call centre that offers the services of the supplier relationship management for manufacturing and wholesale industries. Hereafter, we will disguise the name of the company at the request of its manager and call it Alpha.com. The firm is a professional call centre service provider that contracts customer service operations from various outsourcers and offers the service in Taiwan and China. The outsourcers set up e-business applications (EBAP) and run supply chain management software as the contact points for their clients (CLT), as well as outsource the EBAP supports to Alpha.com. The supports include client registration, computer skills training, business rule orientation, and system exception handling. We analysed computer and telephony integration (CTI) system database in the call centre to investigate the interactions conducted between the CLT and the AGT. Over the last decade, Alpha.com has supported more than 70 EBAP from outsourcers and serves over 70,000 of their CLT. Currently, it maintains about 30 active EBAP, around 20,000 CLT and an average of 8,000 service encounters between CLT and service agents (AGT) per month.

4 ARCHITECTURE OF THE SES MODEL

The SES model was created to represent the call centre services as a whole and be used to describe how the interactions between CLT and the AGT can be supported. In this study, the CCO service consists of a call centre, EBAP from different outsourcers, and registered CLT in which they interact with each others to reach a common goal. The SES model was designed as a three-level hierarchical architecture including a service pattern, a service structure, and a service process to represent different levels of the CCO service. A feedback mechanism was built to collect customer behaviour information from service process levels for CCO managers to adjust service operations. Feedback information can also be collected from internal factors such as historical logs from service encounters,

as well as external factors in terms of strategic, managerial, and operational perspectives. Figure 1 depicts the architecture of the SES model.
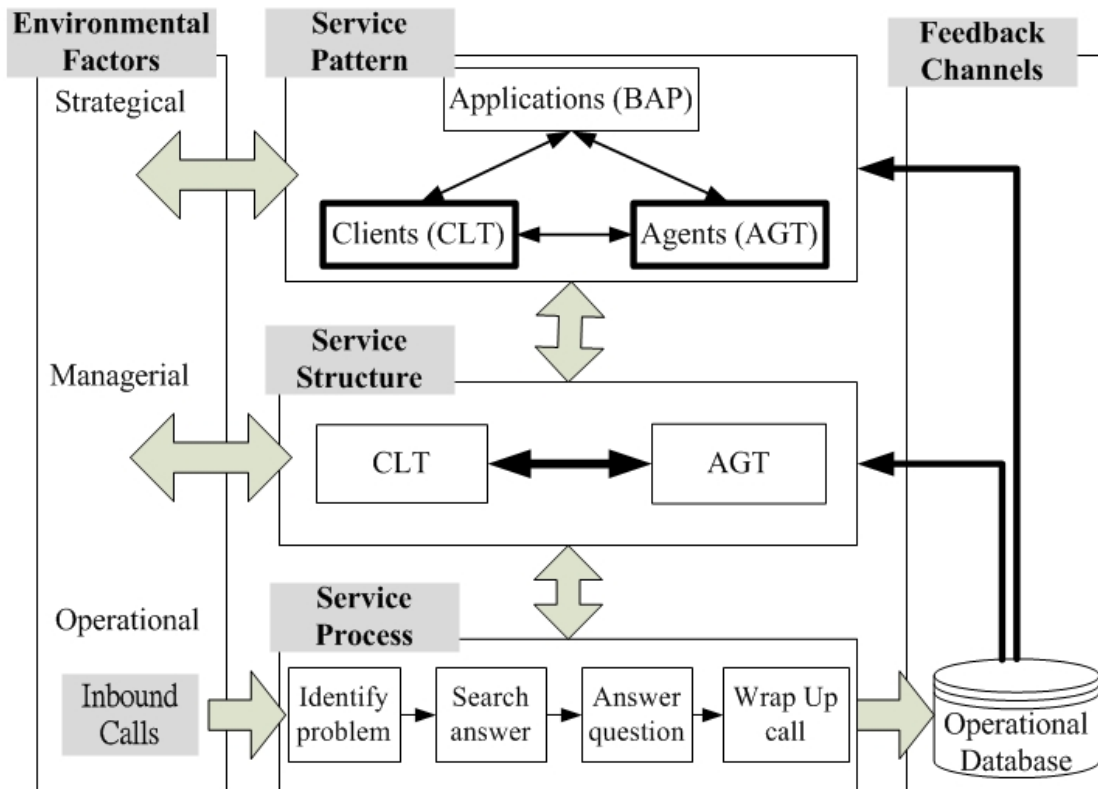

Figure 1.   Architecture of the SES model

The development of the SES model includes service pattern identification, service structure description, and service process analysis. The model contains sufficient contextual information in order to advance the understanding of the managerial situation and to identify observable variables for analysing the problem.

In this study, we characterized each inbound call with a CLT registration number, the EBAP used (EBAP1-15), total EBAP types used (TAT1-15), the question type asked (QT1-12), total question types asked (TQT1-12), and total calls made (TC1-n). The information was collected through the CTI system. Table 1 describes the question types.

Question Types	Description
Q1	Client Registration
Q2	Client Data Change
Q3	Accounting Issues
Q4	System Operation
Q5	System Exception
Q6	Business Rules Support
Q7	Digital Certificate
Q8	Printing Issues
Q9	Computer Skill Training
Q10	Complaints
Q11	Infrastructure Setting
Q12	Others

Table 1.   List of question types

5   MINING CUSTOMER BEHAVIOUR

5.1   Data preparation

This study focused on customer behaviour while the CLT interacted with AGT. The CTI system has a relational database that records the details of each inbound call. We thus extracted operational data from the database to create a transactional table including the variables identified in the previous section. The transactional table contains data from 1st June 2007 to 31st May 2008 and includes 15 outsourcers' EBAP with a total of 100,703 inbound calls. 4,711 of the total calls were made by anonymous callers and 95,992 made by 12,897 registered CLT.

Data analysis techniques were used to cluster the CLT into groups and to discover sequence the question types asked in each group. We used data mining software SPSS Clementine 10.1 for data analysis and applied 'Two Step' algorithm for clustering the CLT and 'Sequence' algorithm for customer behaviour identification.

5.2   Discovering customer behaviour

The CLT and EBAP can have many-to-many relationships in our research setting. Of 15 EBAP, one CLT can use 1 to 12 EBAP. Results are listed below:
- CLT vs. EBAP: Of 12,897 registered CLT, a group of CLT (12,643, 98%) who used 1 to 3 EBAP, made 90.4% (86,801) of the total calls, and most of them (81,595, 85%) were related to EBAP numbers 1, 4, 5, 6, and 13.
- CLT vs. QT: 72.03% (69,147) of the total calls were made by a group of CLT (60,075, 62.6%) who involved two to five question types and the questions they asked were concentrated on QT numbers 1, 2, 3, 4, and 7 (62,693, 65%).
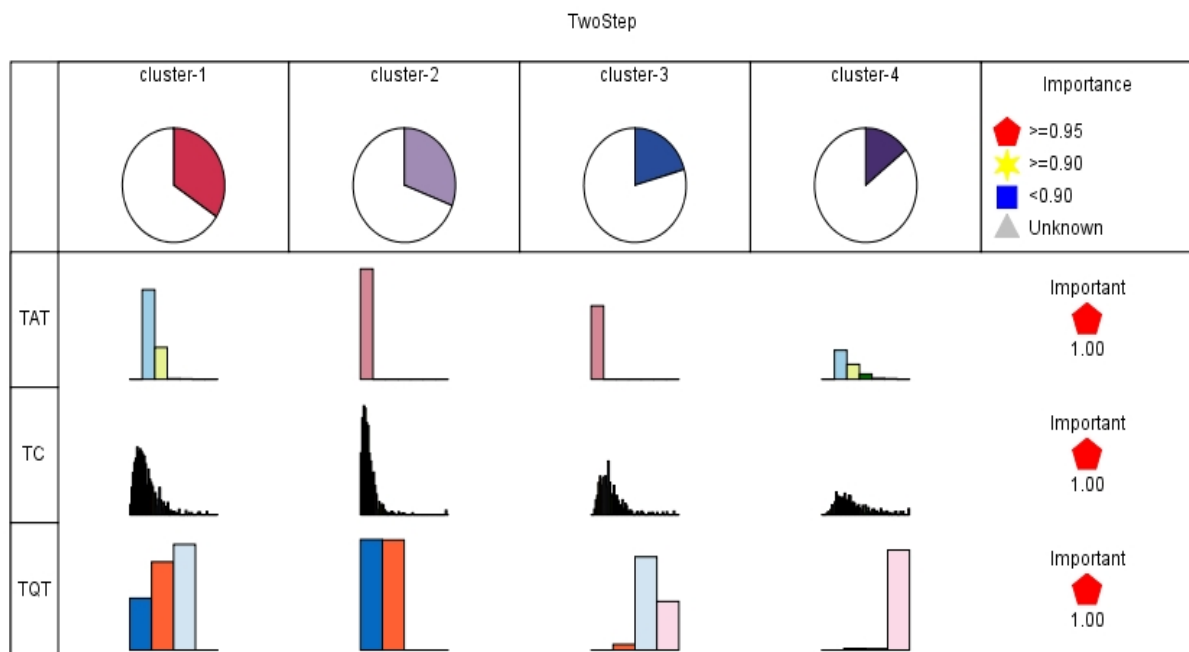

Figure 2.   Profiles of four CLT groups

- Data analysis techniques were used to cluster the CLT into groups: Three variables (TC, TAT, and TQT) were included as the classifiers in the algorithm of the two-step clustering analysis. Figure 2 shows the profiles of four groups of CLT obtained from the analysis.
- Data analysis techniques were used to discover sequence of question types that asked in each group: The sequences of the question types CLT asked can be used to assist AGT in identifying the customer behaviour. We analysed the group of CLT who involved two to five question types and used EBAP numbers 1, 4, 5, 6, and 13. We then used the sequence pattern identification algorithm to find sequences of the question types against CLT registration numbers and the date they made the calls. The rules discovered for clusters one to four are QT numbers $4 > 4$, $7 > 4$, $4 > 4$, and $4 > 4$, respectively.

6　CONCLUSION

The main challenge in studying a service system is to understand how the service activity is actually conducted (Clarke and Nilsson 2008) and how to construct an evolutionary model that can support the service to adapt to the environmental changes (Spohrer et al. 2007). We used data mining techniques to identify the factors that can be used to support service encounters between CLT and AGT in call centre operations. We analysed the variables with the call centre database and identified customer behaviour for call centre managers to improve service operations. We summarize the findings as follows.

We discovered that CLT and EBAP can have complex relationships. Five EBAP attracted most of the inbound calls and most of the CLT used one to three EBAP. This situation can be partially attributed to the popularity of the EBAP that managers can utilize the facts to negotiate their work load with outsourcers. Or the reason might be user-friendly issues within the EBAP that managers can discuss with outsourcers for further improvements. Moreover, most of the calls were made from CLT who used one to three EBAP and over half of the CLT made one to twelve calls. This implies that a service cycle may require three to four service encounters to facilitate a CLT to familiar with the EBAP.

The primary objective of this study was to cluster the CLT into groups. The CLT were divided into four groups according to their behaviour as shown in Figure 4. The secondary objective was to discover sequence of question types asked in each group. The sequences discovered in this study were mainly on question types 4 and 7. These unfavourable results may also be attributed to the imbalanced question types design. This implies that the classification of these two question types may contain many correlated problem statements that may confuse the AGT in identifying problems and searching for answers. Managers can balance the question type classifications and adjust the Q&A set to improve the performance of AGT.

The study of the service industries has attracted many practitioners and researchers attention. Many successful service stories need to be analysed and explained through conceptual models and be further developed as theoretical frameworks before they can be generalised. Future researches could extend the SES model to other service contexts, advance our insights to build a formal service encounter support theory and develop tools to simulate the details of service encounters.

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