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Imbrications of IT and hospitality organizations

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ABSTRACT

The impact of information technology (IT) on the hospitality and tourism industry has been extensively documented in the last two decades. However, what happens during the adoption process and to the organization over time due to changes in IT is unclear. This study applies the lens of "imbrication," stemming from Giddens' theory of structuration, to examine the interactions between a casino resort in Macau, China and the use of customer relations management systems over 20 years (1997–2017). The processes of imbrications of IT and people reveal the social construction of reality. This paper expands our scope of knowledge on organizations' integration of IT by offering a window into the complex, recurrent nature of IT adoption in hospitality and tourism industry.

1. Introduction

Two decades after the Internet's introduction into people's everyday lives, information technology has become the foundation of our society and, undoubtedly, the business world (Yoo, 2010). While many consumers and hotel employees in operations take today's business practices and routines for granted, the veteran hoteliers understand that "Rome was not built in a day"; many aspects of current hotel operations were developed over time, particularly through the support of information technology (Arneberg, 1979; Connolly, Olsen, & Moore, 1998). As reflected in the literature regarding IT and the hospitality industry, firms adopted different information systems at different periods (Ip, Leung, & Law, 2011; Law, Buhalis, & Cobanoglu, 2014). It was a journey from manual information management to IT-based information management. However, other than the anecdotes from veteran practitioners, there is limited understanding of the process of IT adoption and use.

In past decades, information technology (IT) has become the backbone of hospitality business and been increasingly penetrated a variety of business processes. For instance, a modern hotel is now running on a variety of management information systems (MIS) such as property management systems (PMS), online marketing and distribution systems, point-of-sales systems, and customer relationship management (CRM) systems, to name just a few (Buhalis & Law, 2008). These information systems interface with each other to form a management information ecosystem that supports the routines and management decisions in modern hotels (Law et al., 2014). With the advancement of information technology, hospitality organizations have to embrace more technology innovations, such as cloud computing, artificial intelligence, etc. Nevertheless, the adoption and integration of IT innovations in operations are continuous and long-term. How can the continuous adoption of IT artifacts shape the operation and business logic in the industry? Are IT determinants of the organization practice? What are the roles of people in organizations play in shaping practice with the penetration of IT artifacts? These are important questions for practitioners to foresee the impact of new IT artifacts and better manage the IT adoption and integration process.

To understand this phenomenon, two theoretical frameworks have been applied in empirical studies, namely the technology acceptance model (TAM) (Davis, 1989; Venkatesh & Davis, 2000) and diffusion of innovations theory (Rogers, 2003). In the TAM model, studies identify the factors that influence managers and employees to use a particular IT in their jobs (e.g., Kim, Lee, & Law, 2008; Morosan & Jeong, 2008; Wang & Qualls, 2007). With the diffusion of innovations framework, studies identify the organizational characteristics that influence the adoption of IT (e.g., Hashim, Murphy, Purchase, & O'Connor, 2010; Murphy & Tan, 2003; Sahadev & Islam, 2005; Yuan, Gretzel, & Fesenmaier, 2003). Other studies have examined the impact of IT investment on firm performance by testing the

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relationship between IT-related expenses and the financial performance of hospitality firms (e.g., Ham, Kim, & Jeong, 2005; Hua, Morosan, & DeFranco, 2015; Lee & Connolly, 2010). Most recently, studies had been developed to understanding the barriers for the deployment of IT in hotels (Chan, Okumus, & Chan, 2018; Okumus, Bilgihan, Ozturk, & Zhao, 2017). Although studies have provided plausible theoretical explanations for how and why IT is adopted by organizations and why it generates financial gains, the processes undertaken by organizations in IT adoption and use, particularly how they interact with IT at the operational level, remain largely unknown (except the studies by Sigala (2005) and Siguaw, Enz, and Namasivayam (2000)). Furthermore, IT adoption has been treated as a one-off organizational decision or activity, whereas the changes brought by IT are usually progressive and accumulative (Leonardi, 2013; Orlikowski, 2000). A detailed account on the interactions between users and IT artifacts at the operation level after the adoption and the mutual influence evolving with time is leading to a more profound understanding of the impact of IT on hospitality business.

With these research gaps in mind, this study adopts a socio-materialistic view (e.g., Leonardi, 2011, 2013; Orlikowski, 2000; Orlikowski & Scott, 2008) to examine the relationships between IT and organizations by focusing on the ongoing, recursive relationship between technology and the people in organizations. Specifically, we introduce the metaphor of "imbrication" (Leonardi, 2011) along with new vocabulary, such as technological affordance, constraints, human agency, and material agency, which represents the notion of technology in practice. Through this, we examine the generative nature of technology and how organizations perceive affordances and constraints and consequently shape technology. To achieve this goal, we conducted a case study of a major casino company in Macau, China (hereafter the M company) to describe the process of adoption and integration of a strategic information technology, i.e., CRM systems, over a course of 20 years (1997–2017). This case study illustrated the notion of imbrication by examining the integration of a technology of strategic significance to the hospitality and tourism industry within the context of environmental changes. This paper offers a microscopic picture of the interactions between people and technology and how hospitality firms and technologies imbricate together to achieve organizational goals.

1.1. The socio-materialistic view of IT in organizations

The increasingly common use of IT in different parts of organizations offer opportunities for researchers to investigate the influence of IT on organizational structures, processes, and consequences (Orlikowski, 2000). To gain insights into its role and impact on organizations, researchers have developed an ontological view of IT (i.e., regarding the nature and relations of being) within the organizational context. In the past three decades (from the 1980s to 2010s), the meaning of IT has evolved due to the dramatic and unprecedented changes in both technologies and organizations.

Since the late 1980s, a series of structurational models of technology have been developed to conceptualize IT in organizations and explain its role in shaping organizations and outcomes (Barley, 1986; DeSanctis & Poole, 1994; Orlikowski, 1992; Orlikowski & Robey, 1991). In these models, IT is seen as "embodying structures" (Orlikowski, 2000, p. 405) that represents the designers' intentions. Specifically, the structures refer to the rules and resources granted to the technology artifacts by the designers. (DeSanctis & Poole, 1994). With this conceptualization of IT, the use of IT in organizations is an outcome of compromise between the user's intention and the designer's intention. DeSanctis and Poole (1994) identified that people in the organization actively select the ways to use the technology (named as "appropriation", p. 133) and such appropriation determined the effectiveness of the technology after its adoption.

From the late 1990s onward, researchers challenged the meaning of IT that was constructed in the structurational models. First, with more empirical evidence showing reconfigurable and user-programmable technologies, it was argued that technology could be modified through reprograming and by adding modules; thus, it was considered flexible rather than "stable" (Leonardi, 2011; Orlikowski, 2000). Second,

researchers argued that understanding technology as embodying structures deviated from Giddens' (1984) view of structures. The technology only can impose the rules and resources assigned by designers to human action (Orlikowski, 2000) if the technology is put into use. Technology structures are emergent, rather than embedded, from the actions of humans who "regularly use certain properties of a technology in situated ways" (Orlikowski, 2000, p. 407). For instance, the adoption of a property management system in a hotel does not guarantee that the outcome assumed by the designer of the system will be achieved. Rather, the real impact of this system (the real implementation of the rules and resources) depends on the situated use by the hotel employees. Correspondingly, these researchers conceptualized the relationship between people and technology as enactment, rather than appropriation. Orlikowski posited that "rather than emphasizing technology and how actors appropriate its embedded structures, this view starts with human action and examines how it enacts emergent structures through interaction with the technology at hand" (p. 407).

The evolving conceptualization of IT, i.e., from embedded to emergent structure, and of the relationship between IT and people in organizations (from appropriation to enactment) provide refreshing theoretical tools to examine the role of IT in organizations and its impact. The notions of emergent structure and enactment suggest that our attention should focus on the ongoing, recursive relationship between IT and people who use IT continuously, rather than on the functions of a technology and the one-off adoption and use of these functions. The role of technology and its impact in organizations can only be understood by observing the process of people's ongoing use of technology. Researchers in organizational studies adopted the term "technology-in-practice" (Orlikowski, 2000, p. 262) to represent this theoretical lens, the aim of which is to describe the processes in which people in organizations (re)constitute the rules and resources in their ongoing and contextualized engagement with the IT tools.

1.2. Imbrication of IT and organizations

Theories about technology-in-practice have been further extended to analyze the recursive and dynamic development of both technology and organizations. Leonardi (2011) developed a model of imbrication of human and material agency, based on perceptions about affordances and constraints, offering insights into the microscopic interactions between people and technology. The "imbrication" here means human and material agencies are integrated and work interdependently. The metaphor originates from the structure of roof tiles in ancient Roman and Greek architecture, which consist of imbrices (semi-cylindrical roofing tiles) and tegulae (plain flat tiles). Human agency refers to the individual working in the organizations who has discretion and ability (Giddens, 1984). Material agency refers to the information technology that has capability to perform without human intervention (Leonardi, 2011). Leonardi stated that the interweaving relationship between human agency and material agency is similar to the structure of roof tiles consisting of imbrices and tegulae. After the adoption of information technology, people use the IT in the daily practices of organizations and produce routines. As such, people and technologies are imbricated to form an integrated structure, which is embodied as an organizational structure (i.e., rules and resources in organizations).

Fig. 1 visualizes the concepts and process of imbrications. The outcome of each imbrication is either the new technology adoption or the changes in organizational routines. The perceived technology affordances or constraint are the catalysts for imbrications (Leonardi, 2011). The concept of technology affordance is used to explain the mechanism of imbrication between people and technology. Markus and Silver (2008) defined affordance as the possibilities that a technology can offer to users. That is "the potential for behaviors associated with achieving an immediate concrete outcome and arising from the relation between an artifact and a goal-oriented actor or actors" (Strong et al., 2014, p.12). As a material agency, the technology owns its functions but users determine the realization of the functions depending on different contexts. The adoption of the technology will happen if the human agency (HA) perceives the affordances of the
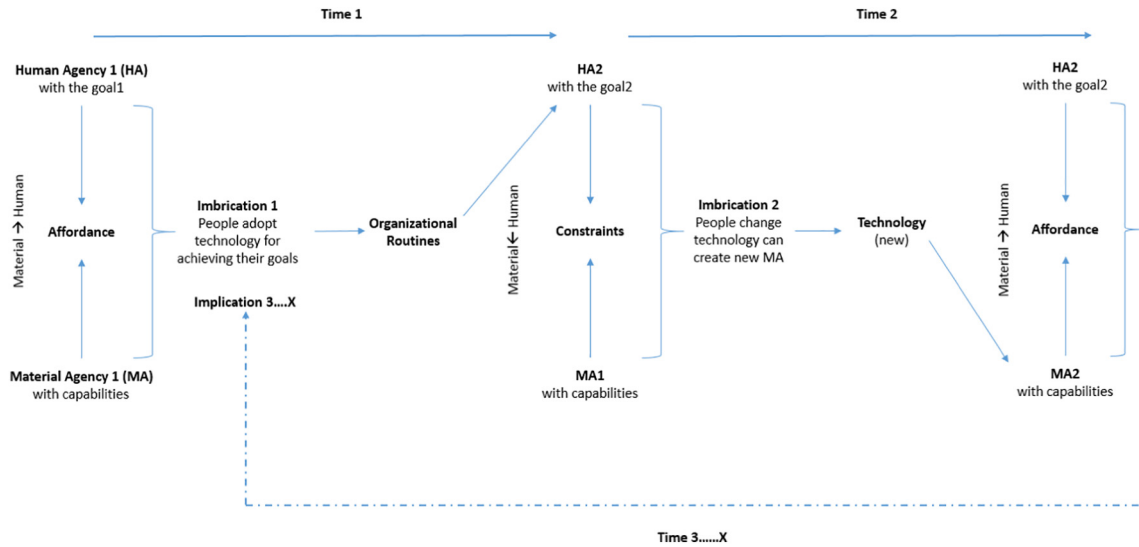
Fig. 1. A conceptual framework of the imbrications of human and material agency.

material agency (MA) because people would like to use technology to achieve their goals. After the adoption and the use of technology in organizations for a period of time in organizations, people and technology are imbricated and such imbrication produces some organizational routines. These routines have staying power in the organization. Therefore, we can say that past human–material imbrications influence how human and material agencies are imbricated in the present. The way imbrication occurs at Time 1 will influence the way it occurs at Time 2. Evolving with time, the human agency is influenced by the external environment and new needs emerging with the time and development of the business. After the formation of the new goals, people perceive the constraints of the technology, rather than the affordance, and they adopt new technology that offer new sets of materiality. Then the new imbrication process is initiated with people and new technology. Fig. 1 recognizes the accumulated nature of imbrications explains how IT adoption and use in the past condition future IT adoption and use.

1.3. The case of the M company in Macau, China

To understand the process of imbrication of information technology and organizations in the hospitality industry, we conducted a case study of a company that ran a range of operations in casino gaming, accommodation, and leisure in Macau, China. We examined how they integrated IT systems for managing customer relationships over a period of 20 years (from 1997 to 2017). Social constructivism is the underpinning epistemology belief of this study. This study explores and interprets the social facts that shape, and are in turn shaped by, the imbrications of IT (material agency) and people in the organization (human agency) through time. The processes of imbrications of IT and people reveal the social construction of reality. The interpretations of the interviewees who participated in the decision-making and implementations of the CRM IT systems at different periods explains how the subjective meaning becomes a social fact.

1.3.1. Customer relationship management systems in the hospitality industry

We chose the hospitality industry as our study context and CRM systems as our focal technology. Over the years, the hospitality industry has changed from its traditional way of doing business to a more customer-focused approach and, as a result, CRM programs have come to play an important role in the transition. The casino industry was among the first to realize the value of managing customer relationships based on the use of detailed customer information. As the gaming industry became more competitive, CRM has increasingly been used as a strategic tool to gain

competitive advantage (Kale, 2005). As such, we saw this as an opportunity to offer a rich account of the imbrication between technology and a firm.

Casinos often develop loyalty programs to maintain good relationships with different types of guests. By joining CRM loyalty programs, guests become members of the casino and receive a variety of benefits (Kale, 2005). As such, casinos need a CRM system to cultivate a segment of repeated gamers, which requires more attention to customers and an understanding of customers' preferences and behaviors. With CRM programs, casinos can capture a variety of customer data such as gaming expenditures and preferences, and then provide them with value-added services (Doyle, 2009).

Previously, casinos focused only on customers' gaming behavior data, which was collected using gaming-based loyalty schemes. As casinos evolved into mega resorts that integrated hotels, retail, food and beverage, and entertainment, customer data grew drastically. New CRM systems have also included the collection and use of non-gaming data (e.g., customer's preferences, important dates, or personal needs) to optimize gaming revenue and customer value, achieve better resource utilization, and support brand development (Doyle, 2009). As a result, CRM IT tools have evolved and upgraded from supporting a single casino unit to facilitating large-scale resort networks.

1.3.2. The M company in Macau

Macau, officially the Macau Special Administrative Region of the People's Republic of China, is an autonomous territory in the Pearl River Delta in China. Macau was a Portuguese colony whose sovereignty was transferred back to China in 1999. Macau's economy is based largely on gaming and tourism. In 2004, the gambling revenue in Macau surpassed that of Las Vegas. However, since February 2015, the gambling revenue in Macau has been falling because of the Chinese government's anti-corruption policies to crack down on gaming activities that use state funds ("Macau," n.d.). The M Company is one of the leading owners of entertainment and gaming facilities in Macau, and has a diversified portfolio of gaming and leisure operations including four upscale hotels; two large casinos; and a great variety of dining, shopping, and entertainment facilities. From 1997 to 2017, the M company expanded its business scope from a single hotel with a private gaming club to multiple integrated gaming resorts including hotels, restaurants, shops, and other entertainment facilities.

1.3.3. Data collection

One of the researchers in this study had been working in the M company since 2008 and had access to personnel who had been involved in CRM implementation and the process of IT adoption. Data collection involved three

sources: in-depth interviews, participant observations, and document archives. The findings of this study were mainly identified from the interviews and company documents, while the participant observation, which covered an 8-year period, helped to partially verify the findings from the main data source (i.e., interviews and company documents). The long span of time required a retrospective approach to trace the changes in the organization. Therefore, the interviewees who experienced the adoption and use of different CRM systems in different time periods were identified for interview. The company documents were checked to verify interviewees' report and provide more details.

• In-Depth Interviews

After several pilot interviews with casually selected employees, 20 key informants (Table 1) were identified based on the following criteria: 1) he/she had participated in CRM implementation in some phases and had mastered at least one of the CRM systems, and 2) he/she had played a supervisor role in the department involved in CRM implementation and use. Interviews were conducted with personnel from three different departments that were extensively involved in the CRM systems. This included operations staff in each department that executed CRM programs, senior IT staff that supported each CRM IT system, and senior management staff that developed the CRM programs. The interviewees were able to provide information for the CRM implementation in different time windows and different areas. All the information contributes to solve the puzzle and present a whole picture of the imbrications of CRM systems and the M company in two decades. The interview questions covered the following areas: 1) changes in the IT systems (e.g., What new features did each IT system bring to the work of your position and the entire department?); 2) changes related to routines (e.g., What changes happened in the organizational work because of the implementation of new IT system?); 3) changes related to human agency (goals and capacities) (e.g., What were the main changes in your goals and functions as the company adopting each generation of IT system? What new aims did you reach by using a new IT system?) and material agency (the IT system functionalities) (e.g. Did each generation of IT system provide any potential to your work, which results in better performance? Please explain in details); 4) socio-materialistic outcomes such as affordances and constraints (e.g., What shortages did each generation of IT system in your work has to hold back you from your goals? How it hindered your work? Please describe it with details at the different generation of IT system you used); and 5) environmental changes during the time of adoption and implementation (e.g., During the evolvement of CRM IT system adoption, did you feel any changes in internal operation requirements or external business environment?). These questions were designed to accommodate the different contexts within the three departments. Twenty

interviews, each of which lasted at least 30 min, were recorded and later transcribed.

• Participant Observation

As a company employee, the researcher had the opportunity to observe all job posts and operating procedures involved in CRM implementation due to his work-related responsibilities. For this study, to confirm the responsibilities and functions of each role, the researcher also spent two weeks observing actual operations at each key position and documented (e.g., by taking photos of) each artifact used for performing each task, including membership registration, entry management, customer relations (CR), membership benefits issuing, market promotions, and pit management (PM) for members' expenditure rating. The researcher took notes of each key action of the users of the CRM software and organized all of the notes based on the objectives of this research.

• Company Documents

The researcher took careful notes on work guidance documents, including job descriptions and standard operating procedures, for each generation of the CRM system. Basic data such as technology functions, organizational goals and responsibilities, organizational routines, and product artifacts (hard copy of any records or stubs in work) were documented.

1.3.4. Data analysis

Data analysis followed the methodology of Yin (1994). Interview transcripts, observational notes and company documents were coded with the guidance of the imbrication framework (Table 2). The researcher paid particular attention to the following aspects of the data: 1) the aims of each team of the casino and how they perceived material agency when they implemented different versions of the CRM IT system; 2) how the organization interacted with each version of the CRM IT system, specifically the change in organizational routines and technologies at each stage; and 3) how the organization and the technology were interwoven and how that lead to new organizational routines. The researcher began with a within-case analysis (Miles & Huberman, 1994) to build separate narratives for each team at the casino: customer relations, membership, marketing, IT, and PM. For each team, the researcher documented the work tasks affiliated with the implementation of the different versions of the CRM IT system along with their goals at the different stages. Based on the goals and tasks of each team under the different versions of the CRM IT system, the researcher paid attention to how frontline staff interacted with the system and what changes were produced in such interactions. The researcher then categorized the different data into the portfolio of the imbrication model to describe the changes in technologies and routines, human and material

Table 1
List of informants.

No	Team	Position	Main Duties
1	Casino Membership & Marketing Management	Deputy Senior Vice President - Membership & Marketing	Manage development & performance
2		Casino Vice President	Manage operation & performance
3	Casino Membership	Membership Supervisor	Membership Registration/ Report
4		Membership Assistant Supervisor	Membership Registration
5		Membership Manager	Manage Membership Registration & Benefits
6		Membership Supervisor	Members and Benefits Analysis
7		Membership Supervisor	Benefits Issue/Report
8		Membership Supervisor	Membership Registration
9		Membership Supervisor	Membership Registration
10	Casino Customer Relation	Customer Relation Manager	Benefit Offer Approval
11		Customer Relation Duty Manager	Benefit Offer Approval
12		Customer Relation Duty Manager	Benefit Offer Approval
13		Customer Relation Senior Supervisor	Customer Service
14		Customer Relation Senior Supervisor	Customer Service
15		Customer Relation Senior Supervisor	Customer Service
16		Customer Relation Senior Supervisor	Customer Service
17	Casino Operation	Assistant Casino GM	Manage Table Operation
18		Senior Pit Manager	Table Operation Inspection
19		Senior Pit Manager	Table Operation Inspection
20	Casino IT	IT Senior Manager	IT Support & Development

Table 2

Coding frame.

The building blocks of the imbrication model	
Changes in technologies	The data covers all main features/functions of each CRM IT system and all changes in features/functions of adopted CRM IT systems from one generation to the next generation;
Changes in routines	The data includes all changes in organizational human resources allocation, tasks and responsibilities distribution, position roles and functions and the way they work;
Human Agencies	This data involves the goals, aims and expectations of the organization has when using each generation of adopted CRM IT system;
Material Agencies	This category aims to collect the capacities for nonhuman entities to act on their own during adoption each generation of adopted CRM IT system;
Perceived affordance	Technology affordances shape the facts that what action potential of each team or the whole company with particular purpose can be carried out with each generation of adopted CRM IT system
Perceived constraints	Technology constraints shape the facts how each team or the entire company was hindered from achieving particular goals by each generation of adopted CRM IT system;
Environment changes	This category of data covers the internal or external environment changes as the background context of each imbrication process and that indicates the initial motivation to the direction of any change or the change itself from the management, thus result in changes in human agencies and technology agencies.

agencies, and the socio-material outcomes for the different generations of the CRM IT system. After the data analysis, we created visual diagrams to illustrate the process of imbrication of the organization and the different generations of the CRM IT system.

1.4. Findings

This section describes the 10 imbrication processes between the M company and CRM systems over the past two decades (1997–2017). The 10 imbrication processes demonstrate the evolution of both IT and the organizational

routines, and presents the ongoing, recursive relationship between technology and people in organizations. From the adoption of the first computer software A in 1997 for casino membership management to the adoption of software E in 2015, each generation of CRM IT tools brought new affordances by which management gained new capacities to achieve different goals at different stages of the company's development. Internal and external needs also brought about new requirements for IT development, and management acted on their human agency throughout this process. The 10 imbrications are represented in Figs. 1 to 6 (each figure represents two periods).

• *Imbrication 1 (Material ➜ Human) in Time 1 (1997–2002)*

Before 1997, the company had planned to open a private gaming club to provide private club services to approved members and needed technical support to manage the membership (HA1 and G1). The club had a VIP gaming room that offered seven tables to play and was equipped with ninety-nine private apartments, indoor recreation facilities, and a luxury restaurant to provide service as commission to gamers and junkets. At that time, however, the company did not have an IT system to achieve its goal. As such, the company contracted an IT company based in Hong Kong to develop a software program (software A) that could help to store members' information in a computer and provide an interface to enter, check, and revise guest information (MA1). By using A, the company had the capacity to manage membership electronically. A reception and membership counter was set up in the front office to help guests fill out the membership application form (OR1–1), enter the guests' personal information, and save the record in software A after the approval of the membership application (OR1–2). As a result, each member could be identified when he/she entered the member club and could enjoy the facilities and services by holding the membership card (OR1–3). Software A allowed the M company to apply a membership business model to the gaming market (Affordance 1). The adoption of A introduced three organization routines (OR1): register members, store members' information, and admit members into the club.

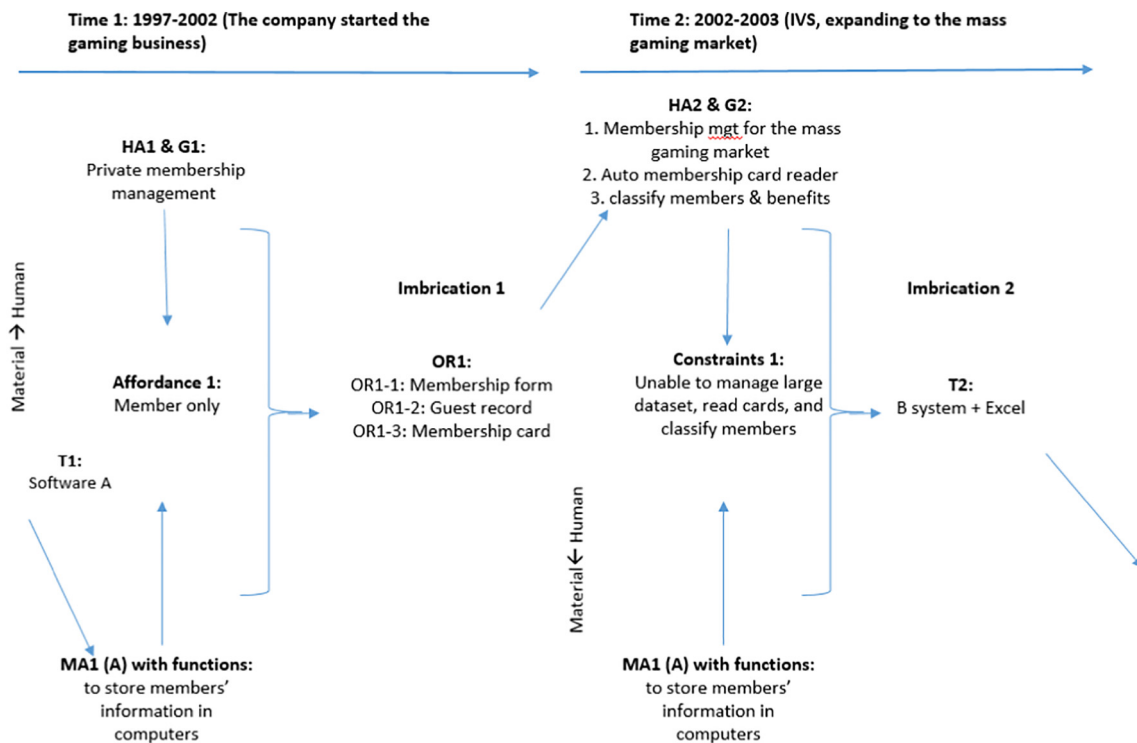• *Imbrication 2 (Human ➜ Material) in Time 2 (2002 − 2003)*

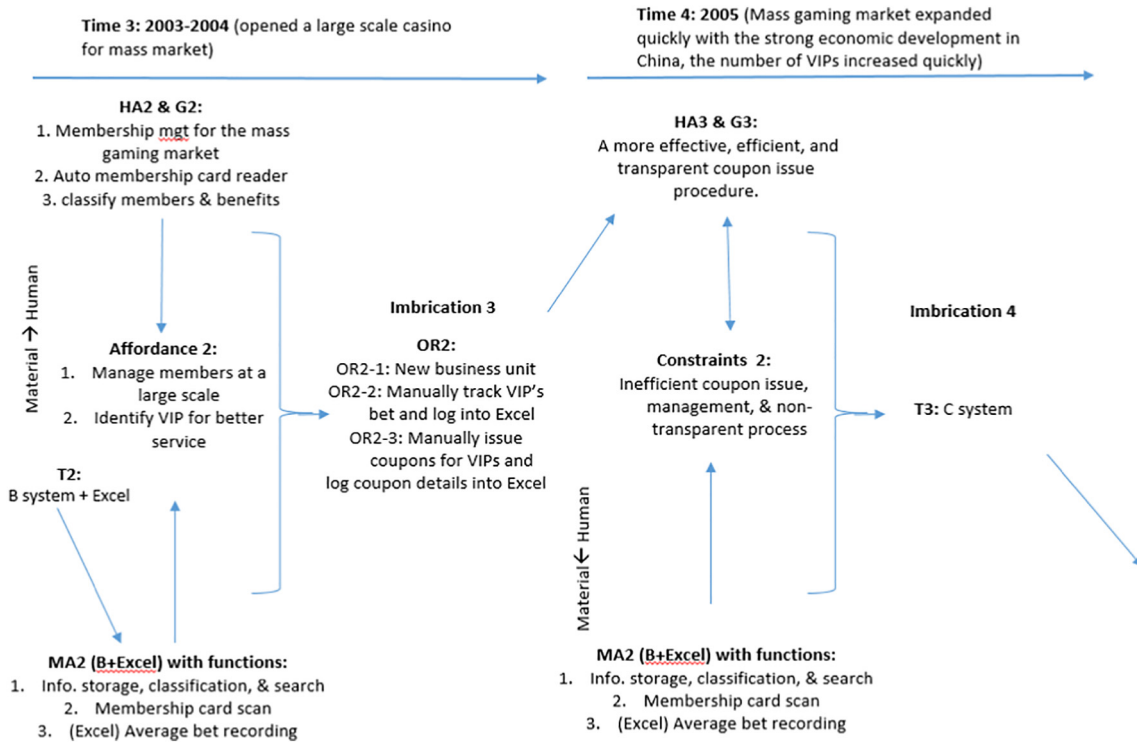
Fig. 2. Imbrications in Time 1 & Time 2.

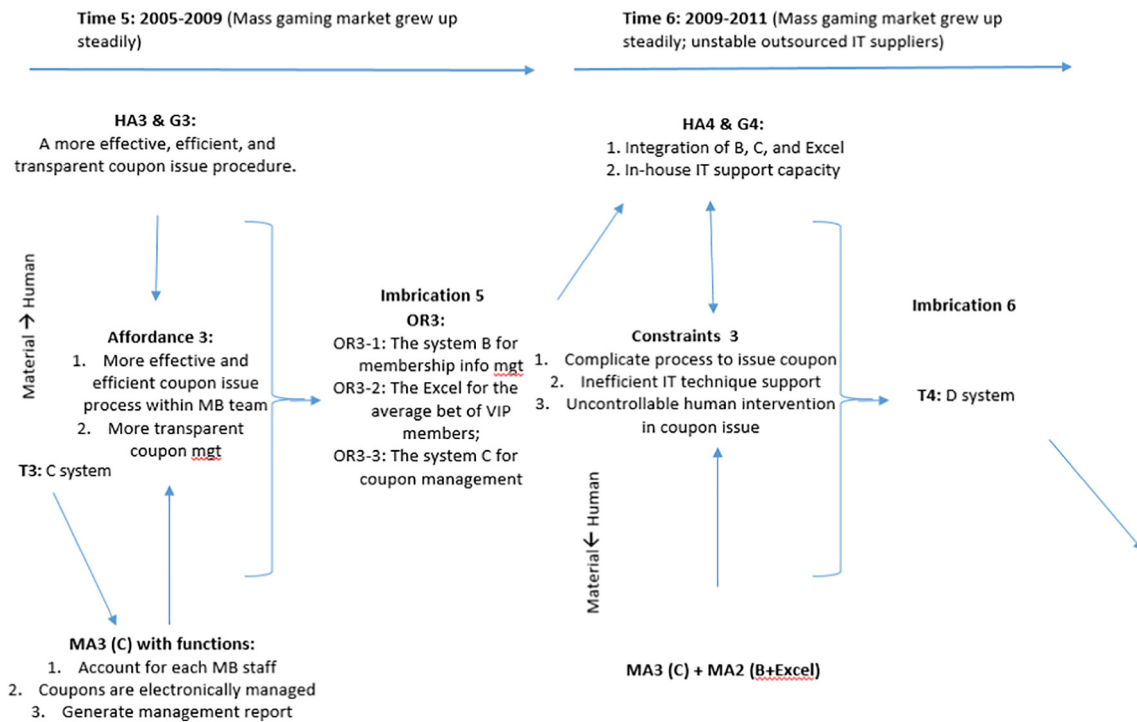**Fig. 3.** Imbrications in Time 3 & Time 4.

Fig. 4. Imbrications in Time 5 & Time 6.

With the introduction of the Individual Visit Scheme (IVS) by the mainland Chinese government on the horizon, which would allow its citizens to travel to Macau without being part of a tour group, an increase in the number of visitors from mainland China was predicted. The M company therefore planned to expand its gaming business to the mass gaming market in Macau. In 2003, a large-scale casino that was a part of the company's property opened as a partner of an upscale hotel. To differentiate it from other casinos that provided a pure gaming environment and to manage customer relationships effectively, the M company management created new goals (HA2 & G2): (1) maintain the membership business model for the mass gaming market and apply the membership management system to the large-scale casino;
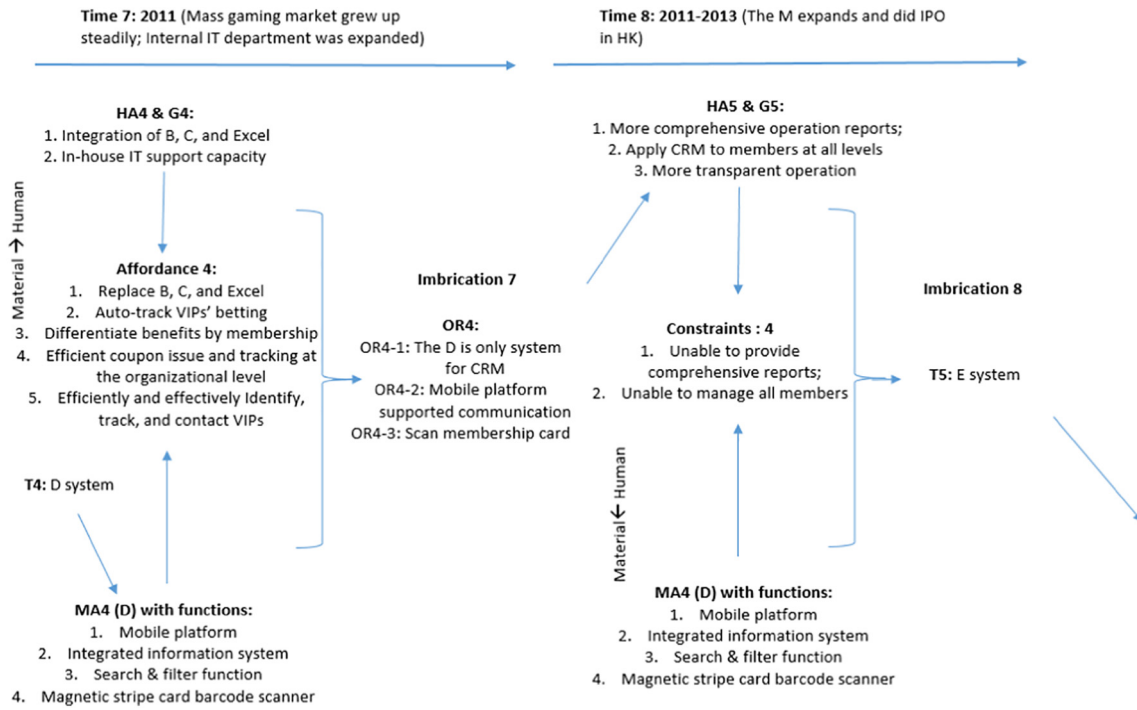
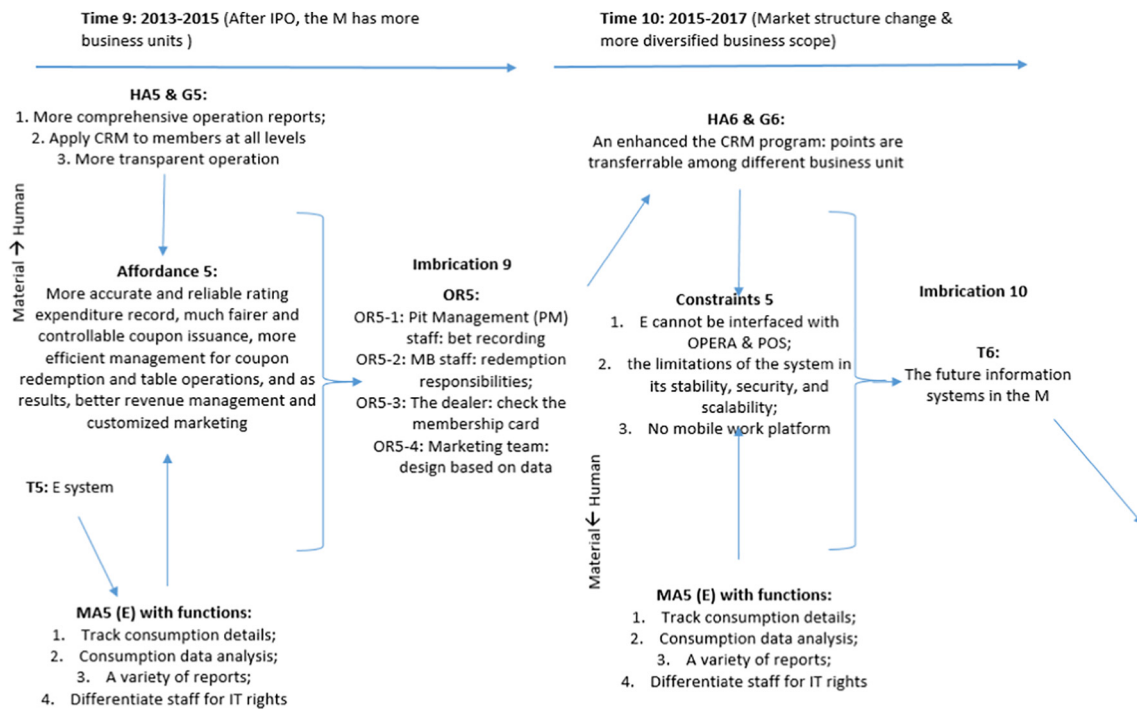**Fig. 5.** Imbrications in Time 7 & Time 8.

Fig. 6. Imbrications in Time 9 & Time 10.

(2) manage member entrances automatically; and (3) classify members and differentiate benefits.

With these new business goals, the management team perceived some constraints regarding software A (Constraint 1). Software A was not able to handle a large volume of members for data entry and report generation. It was also not able to identify and segment members based on their expenditures in gaming and other activities. The company wished to provide benefits such as free hotel rooms, F&B services, massage services, and transportation services to VIP members based on their average bets, and all VIP members were to be issued coupons to claim these benefits at other business units within the company. Thus, the M company hired a Hong Kong-based IT company to develop a new system that could realize full membership management capability. Thus, management system B was born in 2003. It was stored in the newly opened casino and was able to support full membership management and implementation of the CRM loyalty program. In addition to software B, the company used Microsoft

Excel to facilitate the records of VIP members' average bets at tables during each visit.

• *Imbrication 3 (Material ➔ Human) in Time 3 (2003–2004)*

The B system offered material agencies to store member information with classification, search for members, and read cards automatically by scanning a magnetic stripe (MA2). Thus, the large-scale casino was able to serve the mass market with the membership business model (Affordance 2). Meanwhile, the members with high bets could be identified by the B system and classified into the VIP group (Affordance 2). The staff also used Excel to track each VIP's expenditure for issuing coupons (MA2).

The adoption and application of the B system and Excel introduced some changes in the organization's routines (OR2). First, to identify valuable guests and cultivate long-term relationships, the company set up a membership and marketing department to execute the CRM loyalty program (OR2–1). This department consisted of three teams: 1) membership management, 2) customer relations, and 3) marketing. The membership management team was further divided into a membership registration (MR) team and a membership benefits (MB) team. The MR team was responsible for membership registration, guest identification, stopping unwelcome guests, coupon redemption, and generating reports such as members' entry records, benefits records, and average bet records. The customer relations team was responsible for tracking and identifying potentially valuable members, selling VIP memberships to those members, recording VIP members' average bets, and providing benefits for VIP members. Finally, the MB team was responsible for issuing benefit coupons according to the CR team's requests, and double-checking and recording each issued coupon. The marketing team was responsible for planning and carrying out promotions, events and advertisements, and designing and developing various gifts and souvenirs.

Second, each CR team member was responsible for serving a certain area of the casino and tracking each VIP member's betting process (OR2–2). After taking note of each VIP member's average bet with pen and paper, they walked to the central counter where the MB team was located to enter the average bet into an Excel file. Third, the MB staff used Excel to record the bets of each VIP member during each visit and their history of claimed benefits. The MB team issued handwritten coupons to VIP members according to the CR team's request and logged the details in the Excel file (OR2–3).

• *Imbrication 4 (Human➔ Material) in Time 4 (2005)*

As the number of VIP members dramatically increased with the boom in the Macau tourism industry, the membership management team had a growing workload of issuing and recording coupons. Some VIP members started to complain that they had to wait a long time to get their coupons. As such, the membership management team perceived constraints in regards to the software B and Excel support system (Constraint 2). First, the coupon issuance process was very inefficient. To issue a coupon, a CR team member had to physically follow a VIP member, take note of his/her bets, and input the information into the Excel file. Then, a MB staff had to check the Excel record, issue a handwritten coupon to the VIP member, and log the coupon details into another Excel file. Second, it was very difficult to track coupon redemption. As the coupons were handled manually, human mistakes could not be avoided. There were always discrepancies between the internal monthly reports and the payment statements from the accounting department. Third, the coupons were pre-printed and inflexible in reflecting changes by suppliers. If suppliers changed their offers, the printed coupons could not be used and would be wasted. Finally, the recording of bets and the coupon issuance process could not be tracked, and management worried about some staff members playing tricks. As such, management set a new goal to establish a more effective, efficient, and transparent coupon issuance procedure (HA3 and G3). The company decided to create a new system that could support a better coupon issue procedure and contracted an IT solution company in Hong Kong to

develop the new system (software C). In 2005, software C was installed in the large-scale casino.

• *Imbrication 5 (Material➔ Human) in Time 5 (2005–2009)*

The C system offered several material agencies (MA3) to achieve management goal 3. C allowed each MB staff to work separately using individual accounts while allowing information to be integrated into a database accessible to all MB staff. Software C managed the soft copies of coupons so that they could be adjusted manually based on the offer from suppliers. C could also generate reports showing statistics for coupon issue and redemption. It therefore afforded a more effective and efficient coupon issue process within the MB team and offered the management team a more convenient channel for supervision (Affordance 3).

After the adoption and application of the C system, the three teams (i.e. MR, CR, and MB) were using three different IT tools for membership management and CRM (OR3). The MR team was using system B to deal with membership registration and collect members' personal information (OR3–1). The CR team was using Excel to record the average bet of VIP members (OR3–2). Lastly, the MB staff was using system C as a replacement of Excel to record coupon issuance and redemption (OR3–3). With material agency 3, the MB team eliminated handwriting and hand-typing tasks in daily recording and reporting, resulting in more free time to handle other tasks such as managing souvenirs and administrative tasks. As a result, the company saved on costs for coupon printing and labor expenses.

• *Imbrication 6 (Human➔ Material) in Time 6 (2009–2011)*

Although system C enabled the MB team to improve the efficiency of coupon issuance and recording, the procedures, which involved three teams and required three technical tools (i.e., B, C, and Excel), were too complicated to serve the increasing number of VIPs (Constraint 3). CR staff had to be able to recognize VIPs (cognitively), follow up on their average betting records (Excel), and then send requests to the MB staff for coupon issuance. The MB staff would then need to check the Excel record and call the CR manager for approval, who would evaluate the records in system C and Excel. Then, the CR manager would send approval to the MB staff to issue coupons in HSS. The management team perceived constraints in the current IT system and decided to change to a technology that could provide all the affordances of systems B, C, and Excel (HA4 and G4). Meanwhile, the management team recognized the importance of having internal IT support, as IT tools needed to constantly be adjusted with business development and environmental changes, and the outsourced IT company was not able to provide timely support (HA4 and G4). Therefore, the company's internal IT department spent six months developing information system D to meet the needs of membership and CRM.

• *Imbrication 7 (Material➔ Human) in Time 7 (2011)*

In 2011, system D was installed in different business units to replace B, C, and Excel and to rearrange the procedures for issuing coupons and tracking members' consumption. In mid-2009, the internal IT department began programming the new system during their off-duty season and, after almost six months, the first version of system D was introduced. In the following two-year run-in period, the IT team customized system D based on the requirements of the membership and marketing department. System D was able to provide the following functions (MA4): (1) a mobile platform to support the MR, CR, and MB teams; (2) an integrated information system to support CRM; (3) the ability to search and filter members; and (4) a magnetic stripe card barcode scanner. Thus, D was able to replace B, C, and Excel to automatically track VIPs' bets, to manage benefits by member level, to efficiently issue coupons and track redemptions at the organizational level (rather than within the MB team), and to identify, track, and contact VIPs in a more systematic and efficient way (Affordance 4). With D, a new set of organization routines was formed (OR4). First, D was the only information system for membership management in the M company (OR4–1). Second, when the CR staff put in coupon requests through the D mobile device,

the CR manager and MB staff would be alerted to follow up (OR4–2). Third, the MB and MR staff members were able to check a member's status by scanning the barcode on their magnetic stripe card (OR4–3).

• *Imbrication 8 (Human➔ Material) in Time 8 (2011 − 2013)*

Since 2003, the mass tourism market in Macau has been growing steadily. The M company expanded quickly in terms of its business units and scope, and in 2013 the company was reorganized and went public with a redevelopment plan. As a listed company, M was expected to be more transparent to public stakeholders. The Macau government and Macau DICJ imposed more inspections and supervision of its operations, which required comprehensive reports of casino table operations and CRM program implementation, such as daily revenue and records of rewarded benefits to guests (HA5 and G5). Therefore, the management team had new requirements (HA5 and G5) to expand the CRM program to members at all levels (rather than only VIPs) and to make coupon-offering decisions into a more traceable process. However, the self-developed system D did not have the capacity to provide comprehensive reports and reports of table operations. In 2014, management decided to buy system E (T5), a gaming management system used worldwide in the industry. The E system provided comprehensive features and functions to cover and connect different departments of a casino to ensure coherent and systemic control of casino operations.

• *Imbrication 9 (Material ➔ Human) in Time 9 (2013–2015)*

In 2013, system E replaced D for the purpose of organizing and implementing the CRM program. System E was able to 1) track each member's bets and calculate points for coupon offers; 2) classify members and analyze their consumption data automatically; 3) generate a variety of reports to support management decision making; and 4) differentiate staff to grant them different access rights to the database and track their actions (MA5). Thus, with the E system, the M company had more accurate and reliable rating expenditure records, a much fairer and controllable coupon issuance process, more efficient management of coupon redemption and table operations, and, as a result, better revenue management and customized marketing (Affordance 5).

The routines of the CRM program implementation staff in the Legend Group changed thoroughly with the adoption of E. First (OR5–1), the CR staff did not have to manually track and record VIP members' average bets. All average bet recording tasks were transferred to the table operation staff, i.e., the PM staff. Second (OR5–2), because all members could redeem gifts based on the basic points they earned, the MB staff was reassigned to another counter to pay more attention to coupon redemptions. Third (OR5–3), table operation became more efficient than before, as dealers could check members' membership cards and PM staff could record the required data of the play into the system for the rating process. All rating results were stored in E to allow management to search, track, and understand each player. System E provided algorithms for table turnovers and revenue automatically. E could also generate detailed reports of table operations to meet the requirements of DICJ inspections. Fourth (OR5–4), the marketing and promotional campaigns became more data driven and the marketing team could now check data for campaign and promotion designs.

• *Imbrication 10 (Human ➔ Material) in Time 10 (2015–2017)*

From 2013 to 2015, the tourist market structure experienced a substantial change. With increasing pressure from the Chinese government's anti-corruption campaign, the gaming industry's market share dropped dramatically. Gaming and resort businesses experienced strategic changes and started to focus more on the leisure market. As a result, the M company invested in more business units such as hotels and restaurants to cater to leisure travelers. In an increasingly competitive environment, the M company aimed to enhance its CRM programs (HA6 and G6) as a new strategic goal. One of its objectives was to make the benefit points from its casinos and other business units (e.g., hotels, restaurants, and shopping malls)

transferrable. An integrated database needed to be developed to support business units that were developed in different periods. However, system E could not be interfaced properly with OPEA, the PMS system for hotels, and POS, the point-of-sales system for restaurants (Constraint 5). Also, in implementing E, management found limitations in the system in terms of stability, security, and scalability (Constraint 5). Furthermore, while E had improved the overall capacity of the management team, some operational capacities were weakened due to the replacement of D with E. For example, E did not have a mobile app, which meant that CR staff could not use their mobile phones to search and track members. As a result, customer recognition became more difficult and service was not as prompt as it was under system D (Constraint 5). The new human agency and perceived constraints toward the current material agency prompted management to search for new technological affordances and business solutions for the future.

2. Discussion

Looking back over the past two decades (1997–2017), the focal company grew from a small private gaming club into a public company with multiple operations and a much broader business scope. The IT system supporting the membership-based business model evolved from simple information storage software into an advanced information system capable of analyzing input data (i.e., members' consumption history) without any human intervention. Meanwhile, the membership and CRM practice grew from a manual, small-scale operation to an automatic and large-scale one. As a result, the organizational structure and duties of the different teams significantly altered the company's CRM practices.

The 10 imbrications demonstrate the processes by which the current loyalty system has changed since 1997. They also reflect the market changes and economic development in Macau over the last 20 years. As conceptually described in Fig. 1, the ongoing and recursive interactions between people and technology in the organization shape the organization and technology practice (Leonardi, 2011, 2013; Orlikowski, 2000). Between 1997 and 2017, five information technology systems were adopted to facilitate CRM. Each of the five systems was adopted sequentially to replace the previous one. Meanwhile, the organizational routines for CRM, including procedures, structures, and rules, were changed alongside the continuous adoption of new technology. As shown in the analysis, both technologies and routines are outcomes of the imbrication between human and material agency, creating the infrastructures that have staying power and leading to new technologies and routines in the subsequent stage (Leonardi, 2011).

Over the last 20 years, the management team of the M company has reformulated its goals for CRM 5 times. The formation process, which Giddens (1984) called human agency, was driven either by changes in the external environment or by internal management issues. For instance, in Times 2 and 3, the management team perceived constraints in the older system and affordances in the new system due to the strategic movement from a private gaming market to a mass gaming market. Conversely, in Times 4 and 6, management perceived constraints in the IT system because the internal organizational routines could not support the mass gaming market. Furthermore, material agency, defined as the functions of the IT system (Leonardi, 2011; Orlikowski, 2000), was enacted through human agency over the years. The structures that were integrated into the IT systems were activated when management perceived affordances to achieve their goals, and were deactivated when management perceived constraints in the technology for the business. The organizational routines remained embedded in the emergent structure of the technology in practice (Orlikowski, 2000).

The longitudinal context of the study also shows that material agency became increasingly sophisticated with the development of IT. Generally speaking, material agency took over more and more human actions such as classifying members, identifying VIPs, and offering appropriate benefits to members at different levels. The intervention of material agency into CRM became more extensive. Although the early system kept only a record of members, the most recent system made calculations and decisions about offering benefits for members according to their level of spending. The early technology generated only simple reports, whereas the most recent

technology was able to generate a variety of reports to support management in decision making. Thus, human agency came to rely more on the material agency, which further influenced the formation of new goals and imbrication in the next stage.

2.1. Conclusion and implications

This study analyzes and describes the imbrications between IT and a hospitality firm over a period from 1997 to 2017, using a case study of a casino and resort company. Ten imbrication processes are reported to show the ongoing and recursive relationship between technology and people in the organization. This study details the evolution of technology and the CRM program, the changes in the economic and business environment surrounding company M, and the changes in the company's business scope.

This study contributes to the literature related to the impact of IT on the hospitality and tourism industry in several ways. First, to our knowledge, this study is the first to apply a socio-materialistic lens, particularly the imbrication view, to analyze the role of IT in organizational structures, processes, and outcomes in the tourism and hospitality field. The view of technology in practice (Orlikowski, 2000) opens the black box of IT adoption and use in hospitality firms. In contrast to the technology acceptance model (Davis, 1989; Venkatesh & Davis, 2000), the concepts of human agency, material agency, imbrication, and their relations (Leonardi, 2011) capture the process underlying each single technology adoption by managers and identify the factors that shape managers' perceptions toward different technologies. This theoretical lens goes beyond the scope of the theory of innovation diffusion (Rogers, 2003) to reveal the internal mechanisms within organizations (i.e., organization routines) that determine organizational characteristics and technology adoption. The empirical case study demonstrates the usefulness of this theoretical lens in providing a microscopic view and a rich description of the ongoing, recursive process of IT adoption in a hospitality firm.

Second, and perhaps more importantly, the longitudinal case study enriches and even challenges our current conceptualization of the adoption and use of IT in the hospitality and tourism industry. The findings show that technology adoption does not happen in a vacuum; rather, it is a complex, recursive process that involves constant interactions between organizational needs and requirements and the focal technology. These are in turn driven by changes in the macro environment (e.g., the growth of mass tourism from mainland China and the shift from mass tourism to the leisure market due to the anti-corruption campaign in China) and by the capabilities of hardware and software resulting from the evolution in IT. This study clearly demonstrates that, for a hospitality firm, IT adoption is not merely driven by the need to create better operational hospitality services; rather, it is connected to a recognition of a broader and more significant force at a corporate strategy level (in this case, the driving force of Macau tourism). Furthermore, while adoption of IT is, indeed, oftentimes a strategic decision, it is never a one-off decision because the outcome of the decision and its implementation, i.e., new affordances and constraints, generate further needs for another round of IT adoption decisions. Importantly, due to the volatility of the tourism market, it seems that the nature of this decision making is fairly short term, i.e., focused on solving problems in the present moment instead of looking for long-term strategies.

Third, practically speaking, there are a few "lessons" managers could learn from this study. Managers can use this new conceptual tool to have a good grasp of the profound impacts of continuous IT adoption on business processes and organizations. This is of particular importance to the hospitality and tourism industry because many firms in this industry are small- or medium-sized enterprises that are often short on resources (including human, knowledge, and financial support) in technology adoption and use. For a more accurate estimate of the impact of IT adoption in the long term, it is important for them to understand the complex, ongoing, and even "messy" processes of IT adoption and implementation. Particularly, today's hospitality organizations are facing the challenges brought about by the fast-paced development of IT, which is changing customer behavior, industry structure, and business practices. Management teams will need to

make numerous decisions on the adoption of a large number of new IT, on the update of current software and hardware, and on adjustments in operations to match the adoptions and updates. Therefore, for a management team in a hospitality firm, the inquiry into the adoption of IT should be changed from a yes/no question to a what/how question. The case study reveals that the impact of IT adoption is not only from the functions of the technology artifacts but also from people's goal reconciling behavior. Rather than the actual functions of the IT artifacts, the managers should pay attention to how the users in the organization perceive and interpret the new IT artifacts (e.g., its affordances and constraints).

This case study also provides implications for information system designers who aim at serving hospitality organizations. In the focal study period, the requirements of customer service evolved with the changing target market and scale of the business. The managers in the M company continuously were pushed by their perceived technology constraints and affordances to make decisions on the adoption of new information system as well as the changes of organizational routines. As such, for the sustainability of an information system, the designers should closely monitor the evolving nature of business of hospitality organizations to identify the perceived constraints and the potential needs from the operation level and design add-on modules or strategies for system upgrading.

As a case study, this research has some important limitations. While the casino firm provides a rich and intriguing context for examining how imbrication unfolds over a fairly long period of strategic and operational changes, the focus on CRM systems is limited in its specificity and technological scope. We must keep in mind that there is a wide range of IT that may have varying degrees of impact on hospitality firms. Nevertheless, we believe that this case study captures the ongoing, recurrent pattern in IT adoption and use within hospitality firms, as reflected in the longitudinal analysis and the use of vocabulary from a socio-materialistic view of IT and organizations. This study is likely to open doors to many discussions on the nature of IT in relation to the hospitality and tourism industry, particularly when technology seems to be an increasingly dominant force in our society and the market.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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