

2019

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Recommended Citation

Gohar, Shahrzad Roohy and Indulska, Marta, "Business Process Management and Environmental Sustainability – Insights from the Hospitality Industry" (2019). *ACIS 2019 Proceedings*. 80.
<https://aisel.aisnet.org/acis2019/80>

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Business Process Management and Environmental Sustainability – Insights from the Hospitality Industry

Full Paper

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Abstract

Environmental sustainability (ES) is a source of competitive advantage for organizations. However, from socio-technical systems (STS) perspective, a multitude of complex factors is involved in transforming organizations towards environmental sustainability. To facilitate such transformation, all components of an STS, including people, processes, systems and technology, need to be considered. With processes at the core of STS functionality, organizational transformations towards sustainable practices should consider business process management (BPM) as an enabler. ES in BPM research is an emerging topic. To better understand ES objectives, practices, and challenges from a process-oriented perspective, we look to the hospitality industry given it is one of the largest business sectors world-wide. Specifically, in this paper we report on a qualitative study that aims to identify ES efforts and challenges in the Australian hotel industry, exploring the extent to which a process orientation exists to assist with these efforts. Findings indicate an absence of process-oriented initiatives in relation to ES in this context.

Keywords: Environmental Sustainability, BPM, Environmental Performance Indicator (EPI), Information Systems (IS), Socio-technical systems, Hospitality

1 INTRODUCTION

Since the publication of Brundtland's report (Brundtland 1987), a broad range of industries have come under pressure to revisit their strategies and objectives and control their environmental impact (Chams and García-Blandón 2019). Controlling the use of resources and reducing environmental impact provide opportunities for organizations to improve efficiency and also to achieve competitive advantage (Porter and Van der Linde 1995). Indeed, the first agents of change to comply with environmental regulations have achieved competitive advantage (Nehrt 1998).

However, reducing environmental impact, and optimizing and managing environmental performance in an organization is a complex and multidimensional problem – one with a plethora of related factors and issues (Aragón-Correa and Sharma 2003). These involve interdependencies between people, systems, processes and technology inside the organisation and also in its environment. The problem aligns with the Socio-technical Systems (STS) theory perspective (Appelbaum 1997), which considers an organization to be a combination of social and technical components that are connected to, and interact with, their environment (Appelbaum 1997). Algorithms are the core components of STS theory, which are representations of business processes as well as computer programs (Coiera 2007). Business processes are responsible for delivering value, maintaining performance of the work, and supporting services and products in organizations. Yet, it is unclear how organizations use Business Process Management (BPM) initiatives to measure, manage and control their environmental impact and ultimately gain competitive advantage (Hung 2006). Accordingly, the research questions of this study are: 1) how have organizations managed environmental sustainability (ES) initiatives and 2) how, and to what extent, have organizations aligned their environmental objectives and strategies using BPM initiatives. In asking these questions, we seek to understand how BPM is being used to measure and reduce organizations' environmental impact and achieve competitive advantage. Our focus is specifically on the hospitality industry - and hotels in particular – because this industry alone is responsible for 1% of global emissions and travel accommodation is the world's largest industry with a high rate of economic capital growth (Bohdanowicz et al. 2011). There are indications that the hospitality industry is increasingly conscious of their sustainability cost and environmental impact (Gössling and Peeters 2015), making this a fruitful domain to study.

To answer our research questions, we conducted five case studies in medium-large sized hotels. Through our analysis of these case studies, we provide insight into organizational practices, objectives, procedures and challenges with regards to ES, as well as the extent of the use of BPM to enable ES. Our findings indicate a lack of process-oriented approaches and BPM initiatives in general in measuring and improving the business and environmental performance of operations. We argue that the industry would benefit from a continuous, process oriented and holistic management approach to measure, analyse and reduce the environmental impact of operational processes.

The remainder of the paper is organized as follows. Section 2 discusses relevance of IT, IS and their interconnection with BPM discipline through STS. It also provides background on challenges and limitations of ES efforts in hotels through environmental certifications and management systems. Section 3 summarizes our qualitative study methodology. Section 4 reports on the results. We discuss the findings in section 5 and our paper concludes in section 6 with recommendations for future research and discussion of limitations.

2 BACKGROUND

Organizations have undergone significant change in the way they conduct business over the past few decades. Such changes are enabled by information technology (IT) and information systems (IS) advances. Inductively, there is enough evidence to consider that the changes are continuous, and that the changes will need to reflect ES (Hasan 2013). More importantly, IT, IS and BPM can help organizations with changes to achieve environmentally sustainable practices. IT is defined as concepts, tools and techniques for the management of information using computer-based systems and technology (Alter 2008). IS is a broader discipline that embraces understanding and managing the interaction of technology and humans. Specifically, IS processes information and data, and thus supports business processes (Watson et al. 2012). BPM supports interaction of systems, resources, humans and technologies within and beyond the organizational boundaries through business processes and depends on IT tools to manage businesses holistically and through iterative improvement of processes (Davenport 2013). Therefore, IT, IS and BPM are intertwined. Indeed, the interconnection of the IS, IT and BPM disciplines is through management, technology, process, people and systems; the components of STS (Appelbaum 1997).

Researchers have pointed out the complexities of achieving an environmentally sustainable organization (Geels 2018). Indeed, we see hotels, as complex sociotechnical systems, containing opposing factors and complexities in becoming environmentally sustainable. All components of a hotel, including systems, people, processes and technological features (known as STS components), make the whole hotel function as a system. Processes control these connections and functionality. Processes are therefore responsible for delivering value (Appelbaum 1997; Davenport and Beers 1995; Van Der Aalst et al. 2003). Therefore, the BPM field is well positioned to help organizations with their ES efforts (Hasan 2012).

2.1 Business Process Management & Environmental Sustainability

Business Process Management (BPM) is a body of knowledge and collection of techniques and methods used to identify, model, measure, analyse, improve and monitor business processes (Van Der Aalst et al. 2003). It helps organizations to enact strategies into operations (Barney 2001) and to improve work performance. BPM involves a continuous cycle of identifying, measuring, analysing and improving performance with regards to the strategic goals of an organization (Waldman 1994). The same approach is adaptable to managing the environmental resources of an organization. The objective of a BPM initiative is to continuously improve the performance of processes according to a set of agreed objectives. The concepts of business performance objectives and key performance indicators (KPIs) are also applicable to environmental resources. These resources and footprints can be used to measure environmental impact and are known as environmental performance indicators (EPIs) (Jamous and Müller 2013). The six core EPIs (IPCC 2014) that organizations measure include water consumption, energy consumption, waste management, recycling materials, and CO₂ and greenhouse gas (GHG) emissions (Jasch 2000). In the context of BPM, EPIs can be the KPIs that organizations can use to measure the environmental performance of processes. Accordingly, BPM can provide a way to identify, model, calculate, measure and report EPIs at activity levels to measure the environmental impact at a process level, for which there is a need (Epstein and Roy 2001).

2.2 Environmental managements systems (EMS) in Hospitality Industry

Darnall et al. (2008) define an EMS as “a collection of different measures, internal policies and implementation actions which affect the whole organization and the organization’s relationship with the environment”. An EMS therefore “provides practical tools for companies and organizations looking to identify and reduce their environmental impact and therefore constantly improve their environmental performance” (International Organisation for Standardization 2013). Hotels invest in such programs and certifications with the aim to improve the environmental impact, satisfy customers (by aligning with their values), change customer behaviour, and to become recognized as a “Green” business (Rodríguez-Antón et al. 2012).

ISO14001 certification (Whitelaw 2004) is a common and well-known EMS. It provides guidelines for businesses to identify actual and potential environmental impacts, which identify compliance requirements. Hospitality related environmental certifications, audits and programs are designed to provide a means of measurement, control and benchmarking of environmental impact. As an example, ISO14000 (Hamzah et al. 2015; International Organisation for Standardization 2013) provides a framework for environmental management of organizations. There are also other certifications such as EarthCheck (formerly known as Green Globe), a widely known international environmental certification for hotels and tourism destinations (EarthCheck 2018) or LEED (LEED 2019), a green certification program for buildings and resources. Many hotels have also created and adopted their own internal environmental assessment tools in recent years (Accor-Hotels 2012). Subsequent to the commitment of an organization to implement an EMS, organizations require environmental audit processes and reporting systems and procedures. These generally are afforded by implementing an EMS based on ISO14001. In the context of ES, audit processes help organizations to work towards a standard or certification.

However, environmental standard certifications and EMSs have several limitations (Chan 2011; Hamzah et al. 2015). ISO14001, for example, lacks a measuring method for assessing the environmental impact of processes and, therefore, cannot measure and reduce the environmental impact at a process level. Internally developed hotel EMSs generally are limited to internal environmental data and, therefore, lack national or global benchmarking (Bohdanowicz et al. 2011). Moreover, along with implementing any EMS, it is necessary to implement a series of new processes and procedures. At times, the assessment procedures, paperwork and administrative steps can become an operational burden (Bohdanowicz 2006b).

Although certification programs and EMSs have long been used in hospitality sector, research indicates that hotels still have difficulty in measuring, reducing and monitoring the environmental impact of their processes (Bohdanowicz et al. 2011). Indeed, there is a lack of research in the hospitality sector on measuring, controlling and managing environmental impact at business process level while evidence suggests that hospitality has invested more on technological solutions (Ulus and Hatipoglu 2016) to achieve environmental sustainability.

3 METHODOLOGY

To answer our research questions, we conducted five case studies throughout 2018. Case studies are a common method of research in IS and BPM, as well as in the hospitality and tourism industry. A case study is the most appropriate method for our study because the use of BPM initiatives in the hospitality industry is an understudied phenomenon and because a case study provides the opportunity to collect and analyse various sources of data for a deeper and richer look at each case (Meyer 2001).

We chose to conduct our study in the context of the hospitality industry, as discussed in the introduction, because it is known to be under pressure to create, strategize and operationalize their environmental objectives to reduce their environmental impact for two reasons. First, hotels attract a large number of tourists, which makes them and their environment vulnerable to ecological impacts. Second, it is a challenging and conflicting task to meet tourists' service expectations and to at the same time reduce waste, water and energy consumption (Chams and García-Blandón 2019). In our study, we specifically focused on housekeeping processes in hotels because of their impact on the environment and because of their significant influence on the use of natural resources (Hsiao et al. 2014). A housekeeping process involves a housekeeping staff member entering the hotel room and performing steps leading to cleaning and maintenance of the room. In so doing, depending on hotel procedures and customer demands, several resources are used such as water, energy, and chemicals, and the process can also leave CO₂ and a waste footprint (Roohy Gohar and Indulska 2015).

3.1 Participants

To increase our chances of selecting hotels with established environmental objectives and practices, we limited our study to medium-large hotels with over 80 employees and 100 rooms. We did so because larger hotels are known to be under more pressure to become green (Bohdanowicz et al. 2011) and, therefore, are more likely to have implemented EMSs. For qualifying hotels, we contacted housekeeping executives and/or housekeeping managers (the term is used interchangeably in different hotels) to invite them to participate in the study. Because a part of the objective was to understand the environmental objectives, challenges and practices and housekeeping processes in this division, the focus on housekeeping executives ensured the participants had exposure to organizational objectives, challenges, and strategies as well as the operations knowledge of the processes in our study.

The five hotels varied in size (between 80-150 employees) and all were part of different international hotel chains. The information was collected through field notes, interviews, document analysis of operational procedures and hotel websites. Efforts were made to de-identify the hotels and participants in interviews - we use H1-H5 for hotels and accordingly P1-P5 for participants, where P1-P5 are housekeeping executives of H1-H5.

3.2 Interview Protocol

Our case studies rely on two data collection methods: interviews and document analysis. Interviews were our primary data collection method and findings were analysed and contrasted with available literature in the BPM field as well as tourism and hospitality literature. In addition, documents of standard operational procedures provided by housekeeping executives were analysed and triangulated with interview data. Additionally, prior to first interview, we familiarized ourselves with the context of each hotel from various sources of information by studying hotel's webpages and available relevant reports.

The interview questions covered several concepts categorized as: 1) ES as competitive advantage, 2) environmental performance objectives for organizations, 3) controlled use of environmental resources by measuring, controlling and monitoring EPis, 4) planning, communication and motivation for ES in hotel operations, 5) employee awareness regarding ES practices, and 6) BPM. We adopted a funnel approach (Cohen et al. 2007) to the design of the interview protocol. The protocol begins with questions exploring general and broader topics – e.g. 'What does environmental sustainability mean to your hotel?' and 'How important is environmental sustainability to your hotel and your operational area?'. The topic gradually become narrower to focus on environmental performance, and environmental performance objectives. Further, we asked about EMS or any environmental monitoring system in use, and

environmental certifications. Probing questions explored whether current practices were effective for the hotel, what related challenges the hotel faced, and whether they actively consider specific EPIs. A set of questions finally explored what BPM practices were used to manage and improve the environmental performance.

3.3 Analysis

Each interview was audio recorded and transcribed. We used NVivo¹ to code interview transcriptions and to support recording and capturing of categories and sub-categories of concepts under investigation. To code the interview data, we followed the same structure as for the interview questions in terms of categorization of concepts. In the first round of coding, we coded all interview transcripts according to the six concepts outlined in section 3.2. Various sub-categories were identified through this process, such as 'definition of ES', or 'definition of environmental performance'. Any new topic that emerged during interviews was individually coded as a new node in NVivo.

Using this coding approach, we conducted a qualitative content analysis (Bandara et al. 2011) of the interview transcriptions. The coding was conducted by one researcher, in several rounds, until all relevant interview text was coded on the basis of the initial nodes and new sub-nodes.

We also collected and analysed housekeeping operational procedures from four participants. Through this analysis, we gained a deeper understanding of the housekeeping operation and found similarities and differences among hotels when it comes to housekeeping processes. We further explored how environmental practices were reflected in the housekeeping standard operating procedures. Document analysis helped us to better understand the hotels' methods for documenting processes and for communicating processes with operational staff and in general.

4 FINDINGS

Our analysis led to an understanding of the objectives, practices, challenges and general stance of five hotels in the context of ES. The following subsections are presented in the same order of interview protocol.

4.1 ES as a source of competitive advantage

Prior research indicated that ES provides the opportunity for organizations to differentiate themselves from their peers and gain competitive advantage (Walsh and Dodds 2017). In the hospitality industry context, our participants indicated that this too was the case. All considered ES to be source of competitive advantage for their hotel. For example, P3 stated: *"... I think you definitely have an advantage over your competitors. But in saying that too, I think a lot of more different hotel chains are all coming on board with being environmentally sustainable as well. But at the moment I think H3 is ahead of the game"*. P5 replied, *"Absolutely, because I think it makes the guests happy as well to see that we are trying to do something for the environment..."* P4 stated *"as part of our committee, we always have an environmental section at the end, where we can talk, at the end we'll go through anyone who has got any green initiatives, we currently just go through, each member, and look at our sections for the hotel: where we can improve here."*

4.2 Environmental performance & objectives

Environmental performance in an organization is defined by environmental management practices, processes, systems and controls in place that provide improvements in regard to the environmental impact of their activities and for whole organization (Parker and Chung 2018). It represents an organization's commitment to constantly measure, reduce and monitor the environmental impact of their activities. For example, when considering environmental performance, P4 stated *"...wherever we can save on waste, basically, any sort of waste. Going back to our workplace health and safety, we always have what consumption of water for last month and last year.... we have our hotel engineer who monitors that. The water, air conditioning usage, the pumps, everything. We've just gone all LED lighting, so all these little things that we're trying along the way, wherever possible."* However, when asked about defining specific objectives set at the hotels the responses few hotels had an answer. For example, P4 replied, *"...I think just trying to reduce it as much as possible to get to whatever the standard is in general, I guess."* P5 indicated: *"we have a company that is actually here on board with us, what they're doing is finding ways to cut down on energy consumption."* The remaining three hotels

¹ <https://www.qsrinternational.com/nvivo/home>

had no defined environmental objectives, nor an external auditor to liaise with to reduce their environmental impact. However, there were indications of internal environmental programs initiated either by a hotel branch or by the hotel chain. For example, P1 stated, *“we don't have any kind of that audit. So, we call it a quality assurance audit. It is coming in from our head office. Some guys come in here, they're checking our standard”*.

When asked about effectiveness of their environmental performance objectives, three out of five participants believed their hotel was doing its best while two of the participants believed their hotel could improve. For example, P3 responded, *“Yes, there are challenges ... but we're well on the way now to having a really good program but we're always thinking about how we can improve that to make it easier for our staff.”* P5 replied, *“I think for a hotel and for people that are coming to pay to stay here, we do our best to, as you can see to try to help them understand as well. we show them the way to make savings and to help us and the environment too.”* Among the reported challenges, participants cited employee training, motivations at the operational level, guest behaviour, high employee turnover, communication problems between managers and employees and service standards limitations. P3 stated, *“A room customer sometimes doesn't understand what that means and hence that's left up to us then to go back through the bin and take it out and put it into the right bin.”* Regarding challenges with staff compliance, P4 stated *“... a lot of our room attendants, when they've washed the dishes, would just leave the tap running and over and over, and go and do something else”*. P1 stated, *“we can educate our team members for the guest...But some guests, doesn't really care about environment, even when you provide recycle bin or just normal waste bin, they don't recycle it”*. P5 discusses, *“...it's not just the way of changing the mindset of the company itself, it's to change the mindset of guests that visit our hotels”*. These findings extend earlier studies in the tourism context, which identified management attitudes (Bohdanowicz 2006b), motivations (Tzschentke et al. 2008), cost and complexity of systems, and lack of knowledge (Chan 2008) as challenges in planning and implementing ES initiatives.

4.3 Monitored use of environmental resources (measuring, monitoring and controlling EPIs)

When asked about a definition of an environmental performance indicator, most participants were unsure and were not able to define EPIs. In response to the question concerning operational areas in hotels with highest environmental impact, all participants perceived kitchen, food and beverages and housekeeping operational areas to have the most environmental impact. In regard to the existence of an EPI to measure and manage environmental impact, housekeeping executives did not believe such measures were in place at their hotel at the operational level of detail. However, responses indicated that environmental impact in hotels is measured based on electricity and water bills and guest turnover to achieve a per guest-per night measure. P4 stated, *“We do, yeah. So, in our quarterly health and safety and environment committee meeting we measure all of those things [EPIs]. So, we measure utilities trending, we call it, which is energy usage, water. We do look at waste and ... we look at the occupancy and then we track it against occupancy each month.”* When asked about measuring EPIs at an operational level, respondents indicated that there were no means of measuring EPIs at operational levels and housekeeping executives were unaware of the existence of such measurement methods. P5 stated, *“No. I don't personally. I do believe this is something that we're looking at a bit further down the track, as we go ahead.”* Regarding monitoring staff compliance and practices, there were no monitoring procedures in place at an operational process level and monitoring of the adoption of environmental practices was performed by supervisors in the housekeeping operational division. P4 stated, *“... like in any workplace you can't monitor everyone 24/7”*.

When asked about which EPI(s) are perceived to be important for the hotels on organizational level, the majority of respondents stated that use of harsh chemicals, water usage, energy and waste management are the most important EPIs for their organizations. Moreover, all participants agreed to needing to measure and control EPIs. Identifying, measuring and managing EPIs provide the way for measuring, monitoring and managing an organization's compliance against environmental performance standards (Jasch 2000).

4.4 EMS

An EMS plays an important role in an organization's efforts to improve their environmental performance (Jasch 2000). Organizations can be in three states regarding use of EMSs: 1) There is no EMS in place, 2) there is a formal, internally developed EMS in place, or 3) a certified EMS such as ISO 14001 is in place (Jasch 2000). When asked about the use of Environmental Management Systems (EMS), four hotels answered yes to having, at some point in the past, had an internally developed EMS.

However, the system and data were outside the control of the operational areas and, therefore, housekeeping executives had poor understanding of how the measurement of the performance worked in these systems. Two participants also reported of discontinued certification programs. All internally developed EMSs had an initial or one-off training in place for employees of the housekeeping departments.

While prior research indicates that regular environmental training programs and communication procedures for staff result in better management of environmental practices in an EMS and consequently controlled environmental impact (Bohdanowicz 2006a), in most cases in our study, regular training programs were absent with regards to the use of the EMS procedures. P4 stated, in response to challenges regarding communication and training, *"Yeah, communication. Definitely. And getting everybody on board with it, because some people, no matter how much awareness, are just not environmental people."* Moreover, training of staff for their operational procedures as well as environmental considerations is usually once-off and at the start of their employment. In relation to training regularity, P1 stated, *"One-off. When they're starting (employees), yeah. We're just training about what is the EMS for. It's kind of our training system in the hotel. And, in the classroom style, I'm just teaching them what our EMS is about"*. As a final point made about external EMSs (i.e. not in-house developed), P5 noted that excessive administrative processes and paperwork associated with adopting environmental audit programs and EMS were an issue.

4.5 Environmental objectives: motivation and communication

When asked about motivation and communication practice in participating hotels, two participants reported on the presence of motivating programs. P2 stated, *"So, we actually do reward overall, so it's based on sustainability, it's based on productivity, so it's all incorporated into an award each month."* And P1 responded, *"Yeah, we try to do it now. Now our team members realise how important recycling [is] ... we try to give them some, you know, vouchers. Breakfast vouchers. Tried to encourage team members and motivate team members..."* Motivation (Tzschentke et al. 2008) is being considered as an important factor in adopting environmental practices at an operational level.

In response to the question on the means of communication of environmental and operational procedures with staff, P3 stated, *"We're currently working on verbal and visual communications. So, what I will normally do is take them into the loading dock where all the waste management bins are, and we go through each of the three types of waste that we're responsible for on a daily basis. And it's a visual and a verbal then, we find that works better for us to show them."* Despite the challenges reported about communication, respondents had positive responses to this question, which contradicted the findings of challenges.

4.6 ES practices: staff awareness

When asked whether participants considered their staff to be aware of and engaged in ES practices (both in general and in the context of their job), all participants considered their staff to be aware of environmental concerns in general. However, in some cases, language barriers and lack of regular training become a hurdle for housekeeping operational staff in understanding the variations of practices associated with EMS. All participants believed that *consistent communication, training and repetition were a suitable way to improve the staff and also guest awareness of environmental concerns*. P5 stated, *"It's only through talk and briefings and checking on the floors and bringing them back if they're not doing the correct thing. But like I said most of them do, and they're all pretty good at this here. And I think because hotels started to change this way quite a long time ago, they're used to the change"*. P4 stated, *"Well, definitely more awareness, and definitely on our screen out here. Figures of what we need to reach and the reason why and the impact that it's having. I mean, we've just started recording per kilo how much we're donating for the homeless, because we were just giving it away. We really should record that to see how much we're doing, so we've just started for that."*

4.7 BPM and housekeeping processes

While there are multiple processes and sub-processes associated with hotel operations, our interview results indicated a complete absence of BPM initiatives (including those relating to process identification, modelling, improvement, analysis and monitoring) across all cases in our study. When participants were shown an example process model, all indicated they did not have documented process models in their operations. P2 stated, *"No, I haven't actually"*, and P3 replied, *"No, I haven't seen"*. Interview responses were all negative to further questions regarding process management practices in their organizations.

Further questions and document analysis of the standard operational procedures of hotels showed that all participants record and communicate housekeeping processes in text format. Housekeeping procedure documents existed in various levels of details. For example, standard operational procedures for one hotel consisted of a set of high-level instructions, while another hotel had a detailed procedure document that covered multiple scenarios that could occur during the process.

5 DISCUSSION

Sustainability is a central element in tourism competitiveness (Pulido-Fernández et al. 2019). All interviewees regarded ES as a competitive advantage (Porter and Van der Linde 1995) for the tourism industry and reported on organizational-wide efforts to reduce environmental impact. However, our findings suggest participants were not fully aware of their hotel's environmental objectives, which could indicate that environmental objectives were not communicated clearly. Operations management and BPM literature suggest that successful implementation of strategic objectives requires clear and robust communication of organizational objectives with staff at all levels of operations (Liu and Liang 2015). Evidence suggests that BPM enables the alignment of organizational practices with strategic objectives through providing a clear and continuously improving platform for communication of processes using process modelling and governance frameworks (Doebeli et al. 2011), yet BPM is not used in the hotels we interviewed.

Our findings indicated a range of ES efforts being made by hotels, such as adopting EMSs, certifications and various programs to reduce environmental impacts in hotels. However, participants reported challenges associated with communicating their contribution in relation to their efforts (Asmelash and Kumar 2019). Two participants also reported that certification programs had been used in the past in their hotel and had been discontinued. Although participants were mostly unaware of the reason behind the discontinuation of the programs, the findings resonate with prior research (Davis-Peccoud et al. 2016) and necessitate calls for action on designing new IS and processes to better align ES objectives and practices.

All participants reported an absence of benchmarking systems or were unaware of organizational or operational benchmarks for their environmental practices. Several reasons could account for such lack of awareness. In order to develop performance benchmarks for any system, regardless of the context, a standard measurement of performance indicators need to be developed (Zhang et al. 2012). Hotels measure their environmental impact using EPIs such as energy and water consumption on a large scale and based on financial reporting systems (Zhang et al. 2012). The environmental impact in hotels is measured based on electricity and water bills and guest turnover to achieve a per guest-per night measure. But this means that operational areas in hotels do not have access to environmental impact data at an operational process level, which would indicate that developing benchmarking systems without focusing on measuring EPIs at operational levels is not feasible.

Our findings also indicate challenges faced by the hotels in implementing an EMS with associated procedures, training, worldwide benchmarking and monitoring. Borrowing an STS lens, future studies should attempt to design, model and prototype hotel similarities and common features based on the processes and process performance indicators in order to achieve benchmarks for green hotels (Asmelash and Kumar 2019). In our current digital world where large amounts of data are being collected, analysed and utilized, a reasonable approach to tackle this issue would be to use technological advances and develop reference process models to use as benchmarks for green processes for hotels.

Further studies are required on the digitization of objectives and performance strategies to help with effective communication, enactment and monitoring of the environmental objectives. Since enactment of performance objectives and improvement occurs at business process level in organizations, it is therefore natural to look at the business process level to measure and manage environmental impact, as identified by prior researchers.

However, answers given to interview questions regarding BPM suggested that participants were unaware of the BPM body of knowledge and the way it supports organizations to achieve competitive advantage (Hung 2006). We argue that BPM education in the hospitality industry may be beneficial and may assist hotels with reducing and managing their environmental impact. BPM is a mature research field helping organizations to achieve their competitive advantage. In view of that, we call for future BPM research and practice to study the application of BPM in the field of hospitality, to enable hotels to identify, measure and manage environmental impact of their processes and to overcome their environmental challenges using the continuing improvement approach of BPM.

Findings from interviews and observations in the research on the process component of STS indicate the need for more research to explore the opportunities that BPM and process-oriented approaches can provide for the effective reduction of the environmental impact of hotel processes. Lack of communication, training and monitoring of the processes were common issues reported in the hotels we studied. Furthermore, hotels have difficulty in training staff in housekeeping operations due to their high employment turnover. Other barriers to training and communication regarding environmental objectives were reported to be language limitations. On the other hand, process modelling as a means of documentation and communication of processes was not in use in any of the hotels in the cases studied, yet could assist with training. Modelling and communicating processes using standard globally used process modelling languages is common practice in the BPM body of knowledge and has proved to be effective when it comes to communicating the complexities of processes with various stakeholders, regardless of their technical and contextual background.

From the STS perspective (Coiera 2007) and considering the status quo of the EMS together with the absence of BPM in studied hotels, we suggest that hospitality industry could benefit from BPM initiatives and a process-aware IS (Dumas et al. 2005), to better align strategic, governance and operational process components of organisations, in order to achieve effective change; that is becoming environmentally sustainable organisations.

6 CONCLUSION

More than ever, organizations find themselves under pressure to become environmentally sustainable and socially responsible. This study was undertaken with the aim to understand the stance of hotels regarding ES. We enquired about the environmental objectives, challenges, programs, motivations, performance indicators, communication and training of the hotels, focusing on their housekeeping operations. Likewise, we identified whether and how BPM has been recognized or adopted as a holistic and process-oriented management approach to help hotels achieve their environmental objectives. Prevalent findings suggest that all the hotels studied consider ES as their competitive advantage and are under pressure to reduce their environmental impact. In addition, although there are internal programs, operational efforts and certifications being adopted by hotels to manage their environmental objectives, findings indicated challenges existed in identifying, measuring, analysing, benchmarking, communicating and monitoring the environmental impact of operational areas. Surprisingly, we found the complete absence of BPM initiatives in the hotels studied. We recommend hotels adopt BPM initiatives to align strategic objectives with operations, for example, to reduce the environmental impact of their processes. We further recommend the hospitality industry identify, measure and manage EPIs on operational processes. Future studies should include building reference process models for green hotel processes so hotels can use green reference process models nationally and worldwide for improvement and benchmarking purposes.

Finally, this study is not without limitations. One researcher conducted the interviews, coding and analysis of the results. While the context was chosen to be the hospitality industry with a focus on housekeeping processes, the approach, insights and suggestions should be applicable to other processes in hospitality and beyond tourism. Since single round case studies were conducted and while efforts were made to rigorously collect data, the generalizability of the results remains limited. Additionally, the cases studied are medium-large sized Australian hotels, therefore, the findings do not represent other countries or small hotels. Moreover, we have tried to ask open-ended questions and tried to completely avoid manipulation of participant's answers, but, due to the nature of some of the questions, some participants might have felt compelled to emphasize certain aspects more than others. It is envisioned to complement this research be complemented by studies with further rounds of data collection and to reduce the limitations by introducing additional interviewers, coders and analysers of the results.

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