

Towards an understanding of how Big Data is changing revenue management in hotels

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1. Purpose

The hotel sector has gone through a revolution in the last two decades with increasing competition and consumer power driving the need for extensive development in Revenue Management techniques. At the same time major hotel companies have been shifting towards organisational models that favour management contracts and this has meant spending money on developing sophisticated revenue management systems that make their brands more appealing to potential partners who are willing to take on the management of hotel units. Alongside these hotel specific trends has been the growth of what is termed Big Data, which impacts organisations from the individual unit level through several, spatial dimensions up to the corporate level of a global chain.

Within the hotel sector Big Data plays a unique role in the growth and complexity of the main competitors sharing market and revenue metrics through third parties such as STR Global, which now provides daily, weekly, monthly & annual data for benchmarking and planning purposes. The combination of these themes is that individual hotel or revenue managers are faced with an explosion of data points which has grown from an afternoon ring round to local competitors to test occupancy levels to data points being constantly refreshed on their mobile device several times a day. Data is becoming the currency of management in the hotel sector today and due to this, questions arise as to whether the amount, variety and speed of data which managers have to deal with, is actually beginning to undermine the currency of data itself. In this paper we report on our research programme which is examining how big data has evolved, how it is changing some of the key aspects of hotel management and some plausible scenarios of where it may take revenue management in the future.

2. Literature review

The literature concerning Big Data indicates an on-going debate over the origins of the term, which is often based upon a tension between supposedly old and new meanings. When an early mention of Big Data is found, academics tend to argue it does not represent the meaning of the term in the present context. Charles Tilly (1980), a sociologist, is often credited for the first published use of the term Big Data, when in a working paper he wrote that “none of the big questions has actually yielded to the bludgeoning of the big data people”. Diebold (2012) argues this could not have been a reference to the highly technical Big Data seen today but actually just the use of creative alliteration. However, the academic literature supports the idea that it was Douglas Laney (2001) who developed the three V’s of Big Data, including volume, variety and velocity, that encapsulates modern day understanding of Big Data (Chen, Chiang and Storey, 2012; Kwon, Lee and Shin, 2014; Phillips-Wren and Hoskisson, 2015).

However, there are currently few academics focusing on the role of Big Data in decision-making within the hospitality industry and certainly even less focusing on decision-making at unit level and therefore it is hoped this research will advance understanding in this area. Where research has been carried out the focus has been on the impact of analytics on casino hotel operations (Garrow and Ferguson, 2008; Ferguson, 2013), electronic data exchange in hotels (Leung and Law, 2013) and data-mining (Ho Ha and Chan Park, 1998). This demonstrates that often Big Data is considered to be the raw material of a more complex process encapsulating business analytics, business intelligence and knowledge management. Indeed the literature on revenue management in the hospitality sector if anything suggests a move away from thinking of revenue management and pricing decisions as mainly a data gathering exercise to one of data analysis and absorption into other management decision making processes (Haynes and Egan, 2014).

The key issue here is that data and knowledge are not the same thing. Having access to huge quantities of data does not make managers instantly knowledgeable, informed decision makers (Lewis, 2006; Liberatore and Luo, 2010; Biran, Zack & Briotta, 2013). Data has to be correctly interpreted and converted into knowledge for this to be the case and as data becomes increasingly unstructured as we include data sources such as user generated content from social media and

review sites this challenge will only intensify. There is also a great fragmentation and variety of data for hotel employees and managers to sift through from competitor data to financial accounting data which adds complexity. In order to increase the strategic value of knowledge academics maintain that before any data is collected managers have to ask the right questions, in order to source data that will actually provide an accurate answer to those questions thus supporting accurate decision-making (Liberatore and Luo, 2010; Biran, Zack & Briotta, 2013). Crucially the resulting data once converted into knowledge can be effectively transferred around the business. This structured approach to data collection, just as in a research methodology should enable managers to demonstrate the reliability of their decision-making to a wide range of stakeholders. The concern around Big Data is that managers might rely too much on the increased automation of data collection and turn their backs on intuition and instinct. Some academics would argue that relying on Big Data in decision-making actually removes ambiguity and leads to more accurate decision-making (Davenport & Harris, 2007; Liberatore and Luo, 2010) but possibly in hospitality where human interactions are so central to the process, experience, intuition and instinct can still play a vital part in helping managers and employees make sense of and interpret data.

Even when managers successfully manage to convert data into knowledge if they keep that knowledge to themselves then it will be of little use in the decision-making process, which is why data requires co-ordination and integration (Connell & Voola, 2007; Hayne, Troup & McComb, 2011). The key reason for this is that all employees and managers should be working towards one version of the truth (Liberatore and Luo, 2012). If everyone is looking at different data sets this is hard to achieve. Somehow we need to work towards simplifying the complexity of the large amounts of varied data that is accessible. There are two keys to achieve this, firstly unlocking data stored within employees and managers and also silo-busting to achieve cross-functional integration. Academics agree that all employees are walking data generators collecting data daily on things such as customer feedback (McAfee and Brynjolfsson, 2012). Therefore this data needs to be extracted and stored centrally so that the entire business can benefit. This is a challenge and often there are multiple reasons why employees may wish to withhold data either intentionally or unintentionally. Silo-busting refers to the avoidance of holding different pots of data within departments or functional areas where other teams cannot access it. Zeng and Lusch (2013) go as far to say that this requires a culture change in businesses and that we shouldn't view the collection and analysis of data as transactions but rather a complex ecosystem of interconnecting data sets. Leung and Law (2013) researched integration of hotel systems such as property management systems with data generated through third-party sites and agents for instance and termed this electronic data interchange. Ultimately all data must be centralized.

However, there are many challenges in applying Big Data to make sound decisions in the hotel sector. As already identified data is constantly being updated and changing (Laney, 2001), so there is a great deal of time required in ensuring that the data used is current and relevant. Managers and employees need the time and flexibility to react to changes in data that may affect the decision-making process. This may also result in more time being spent making decisions as the volume of data available allows managers to make more complex decisions than ever before. In terms of cost, however, not only is there the labour cost in the time taken to collect and analyse data correctly but also in the hardware and software that allows us to achieve this such as analytical software and data mining. With this also comes the issue of skills and the willingness of hotels to adopt new technologies. The industry has often been slow to adopt a new technology which means that it could miss out on the full benefits of Big Data (Leung and Law, 2013). Not to mention that data management and analysis are complex techniques requiring advanced analytics in an industry already suffering from a skills shortage. Are we expecting too much from operational employees and managers when we expect them to interpret and make decisions based on such large amounts of complex data, especially given the operational cost and time pressures faced in a highly competitive global hotel market. Hotels need to have the right culture in place (Kiron & Shockley, 2011; McAfee and Brynjolfsson, 2012) and one academic looks at three levels of data acceptance and development in hotels from aspirational, experienced to transformed (Lavalle et al, 2011). It is perhaps arguable that most hotels are in the aspirational category but this research will explore further how much truth lies behind these observations.

3. Research question/hypotheses

The research question is focussed on understanding how the massive increase in amount and complexity of data is influencing how hotel managers make day to day revenue and pricing decisions, as in many hotels the price of a hotel room may be changed and revised at least daily.

4. Design/methodology/approach

Two approaches have been used to engage professionals in the hospitality industry focussing on those individuals who either make the pricing and revenue decisions or those who influence those decisions as increasingly this is becoming a team decision rather the decision of an individual.

A Delphi approach has been selected to develop this research, using the Padlet online pin board software. Although Veal (2006) suggested that the Delphi approach had been previously underutilised in leisure and tourism research, both Robson (2002) and Donohoe and Needham (2009) are confident of its use in utilising a group of experts to clarify and refine a research question. The virtual pin board also facilitates the collection of data at a distance in a time efficient manner and allows engagement with respondents in real-time, increasing participant engagement. Two hotels were involved in this study as it was a pilot study to test the method, with a minimum of five rounds of Delphi, with a round taking place each week. The hotels were selected as they were part of chain, large enough to have specialist managers and hold formal weekly meetings to review the performance of the hotel using a wide variety of data. The General Manager was sent a brief of the research project and the initial research question for the first round via a link to Padlet. Each relevant employee or manager was then expected to complete an entry in response to this question on the Padlet. The guideline was a minimum of one sentence per respondent and that it should take no more than five minutes per manager per week and it was suggested that this be completed at the weekly operations meeting to again encourage participation. Feedback time was kept to a minimum as what was needed was to get the instinctive reaction of the respondents as an honest response is so crucial in guiding exploratory research in its early stages, in line with the Delphi approach (Linstone and Turoff, 1975). Subsequent questions were sent through each week and those questions emerged from the responses of the participants.

The themes emerging from this research were then used to a structure questionnaire with open questions rather than an interview. It was felt participants would find this survey quicker to respond to, increasing participation. The questionnaire was kept to only five questions, the first being three closed, categorical questions, covering sector, job role and industry experience and the last two being open questions to gather qualitative responses to the two main questions of 'How would you define the term Big Data?' and 'What is the most common type of Big Data you handle on a daily basis?'. The questionnaire was generated in Survey Monkey and distributed to a series of nine membership only, industry focused LinkedIn groups via the discussion section of the LinkedIn group page. Background on the questionnaire was provided along with a link to the anonymous questionnaire. The LinkedIn groups who were selected were Hospitality Analytics, Hospitality Sales, Revenue and Customer Service, Hotel Industry Professionals Worldwide, the HBAA and Revenue Management Professionals, Travelclick – Hotel Revenue Management, Hotel Technologies and Software, Hotels Magazine – Hotel Industry Decision Group and Travel Analytics Professionals. This was both a convenience and purposive sample, as groups were chosen that would likely respond due to having an interest in the topic and also purposive, as they would likely work within hospitality. The use of LinkedIn was also chosen as it was felt that the medium itself would increase participation. Thacker and Dayton (2008) confirm the idea that utilising social media channels for research could lead to better participation than traditional methods as respondents are used to creating content and responding through these mediums. The data analysis was carried out using a basic manual content analysis to quantify the number of times that certain phrases or words occurred in the definitions the respondents gave and the types of Big Data they used. This information was collated into graphs, which can be seen in the findings and discussion section.

5. Findings

Of particular interest so far are the qualitative findings where managers see big data as lots of numbers, complex but a basis for decision-making. The respondents in this research widely agree that Big Data is characterised by large, complex data sets requiring analysis. However, in line with the

literature, there was little agreement on the definition of “big”, with variations of quantitative descriptions varying from “more than 100 data sets” to “over 100 million rows of data” and imprecise qualitative language such as “overwhelming” or “large” or “tons of data”. What is clear is that hospitality practitioners recognise the data they handle is large and complex and that to understand it they must analyse the data often using technology. From the responses, it was clear that managers recognised Big Data is more than a raw material and that its value can only be unlocked through analysis, but commented on being “overwhelmed” by the process. This almost suggests that at unit level the amount of data hampers the analytics process. These challenges are perhaps exaggerated in hospitality where complex management structures, such as franchises and management contracts, increase data flows and variability of the data.

6. Contribution and discussion

The major issue appears to be that there is too much data and not enough time to interpret it. This in turn causes a silo-effect. Managers recognise the importance of data analysis but don't have the time to do it. It appears that if managers know they have too little time to utilise the data available then the likelihood is that they will revert to focusing just on the data that will help them achieve success in their specific role or to meet their annual targets. (Haynes and Egan, 2014). A manager who is targeted on the performance of his hotel against its competitor set will place primary focus on the STR produced competitor set data. A sales manager who is targeted on the number of bed nights achieved per month becomes only interested in occupancy data and consumer feedback rather than considering revenue per available room or average room rate. The danger here is of course that vital data that would in fact support both these roles gets ignored and that revenue management gets broken down into its component parts rather than being viewed as a organisation wide strategic decision. The major challenge appears to be selecting the best data from all the data collection points and reports within the business. In a fast moving business such as hotels decisions appear still to be based solely on intuition and past experience rather than data due to lack of time and the inseparable nature of the guest/employee interaction. Employees often do not have time to refer to a data source when they have a guest in front of them and need to make a quick decision. This may result in unit managers ignoring the revenue management systems the corporate head offices have invested in.

Initial indications are that this lack of analytical knowledge is down to a lack of specialist knowledge of data analysis and data management resources. When asked it appears that none of the managers involved in the research had specific data analytics training or statistical expertise, for instance when looking at their index rating within competitor set data they didn't truly understand what an index was showing them.

7. Managerial Implications

In the hotel sector the data is booming but there seems to be a paucity of skills on the ground to successfully interpret the increasing volumes of data arriving in various mediums. Understanding the realities of the way hotel managers make pricing decisions with data rather than presuming we understand will hopefully result in more practical solutions for making data analytics led decisions in a fast moving environment.

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