Big Data & Analytics for Service Operations: Innovations and Challenges

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ABSTRACT

This study examined the usage of big data & analytics for innovations in service operations. In a current industrial economy, service companies hold major share of India's Gross Domestic Product (GDP) and employment. Management of service operations is essential for the economic growth of a country. India's service sector includes trade, hotel, transport, storage, information technology, communication, financing, real estate, insurance, business service, personal, social services and other variety of activities. The service operations managers have to provide decision making in the context of variety of services. In service industries data is generated by devices, service blue prints, service life cycles. Researcher has designed how big data and analytics can be used with service blue print for new innovations to improve the service quality. This paper outlines the value of big data offers for service operations, innovations and challenges.

Keywords: Big data; Analytics; Service blue prints; Service operations; Innovations

1.0 Introduction

The productivity of services has recently become an intensively researched topic (Biege *et al*., 2013). Innovation is regarded as new creations of economic significance (Manley, 2007). The focus on new service development and adding value with current services has forced companies to rethink on their strategies. Companies have to move towards collaborations with exchange of data. The use of big data and

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analytics can offer value for companies in each area such as new service developments, service quality, facility location, service inventory, blue prints, managing capacity and demand (Akhtar *et al*., 2016). Big data analytics is now viewed as a disruptive technology that will significantly transform business intelligence and analytics (Olszak & Zurada, 2019).

In this paper researcher explored the role of big data and analytics in the global services operations. First authors explain big data, analytics and service blue print with previous literature.

Second phase shares information on challenges of 5V's of big data in service blue print. Then provided digital transformation innovations for service blue print to improve efficiency and competitiveness in service operations. This research will be helpful for industry and academia to understand service blue print, big data, analytics and digital transformations of service blue prints to develop new services or improve efficiency in existing services.

2.0 Big Data Analytics

Big data refers to datasets which are large in size and difficult for processing by using traditional tool and techniques (Constantiou & Kallinikos, 2015). Big data technologies have a positive impact in various industrial areas such as: it helps to improve supply chains; increasing sales and managing customer loyalty in marketing. It reduces costs in services by using real-time data. Minimises risks in financial and healthcare sectors. Big data has heterogeneous datasets in the digitised, networked and sensor loaded information. Big data can be described with 5 V's such as volume, velocity, variety, veracity, and value (George *et al*., 2016).

In today's digital era almost all types of services have a digital presence and are data oriented. Service firms interact with their customers through several channels. The challenge then is to transform the data into strategic levers that help the firm to improve the current customer experience and quality of service. Data-driven decisions are better decisions. Using big data enables managers to decide on the basis of evidence rather than intuition.

Big data and analytics bring a new source of competitive advantages for service sector to carry out service operations so as to obtain visibility and capability to adjust under demand and supply fluctuations It provides insights into customer behaviours and patterns so that companies can take decisions on pricing and quality services. Companies seek to use their data to identify trends, detect patterns, and to know their customers' habits and preferences better.

3.0 Service Innovations & Service Blue Print

Service innovation is referred as the new invention that is taking place in the various contexts of services (Robert & Nambisan, 2015). It includes the introduction of new services or incremental improvements in the existing services. It is basically different from product innovation due to lack of tangible nature.

Services may be highly custom-made according to the client/customer needs, and include many different stakeholders. Hertog (2000) has presented the "four-dimensional model of service innovation", it captures the idea of service innovation in a knowledge-based economy (De Brentani, 2001). The model consists of the following dimensions:

- Service concept: A new service in the market
- Client interface: A new way as to which clients are involved in the service production
- Service delivery system: A new way in which the actual services are delivered to the customers
- Technology: Make sure that the services can be provided efficiently with technology

4.0 Service Blue Print

A service blueprint is a strategic tool that helps service provider's team to understand how the customer experiences a service. It is a diagram that visualises relationships between people, processes, physical and digital touchpoints created to a specific customer journey.

Service blueprint was initially introduced in 1984 by G. Lynn Shostack in the Harvard Business Review. Service blueprint diagrams visually map out the steps in a service process, making it easier to design a new process or to document and improve an existing one (Bitner *et al*., 2007). It is a process control technique for services that offers several advantages:

- More precise than verbal definitions
- Helps to solve problems early
- Assists to identify failure points in a service operation

5.0 Service Blue Print Elements

Physical Evidence: It is proof that the interaction actually happened with customer and service provider.

Customer Actions**:** It is provided by the service provider to map customer journey and extract information on steps, choices, activities, and interactions a customer may go through to meet their goals.

Onstage Actions: These actions happen in front of the customer. They are either human to human or human to machine.

Backstage Actions: These actions are not visible to customer

Support Processes: These are steps and interactions that support onstage employees to deliver a service to their customers.

Figure 1: Service Blue Print Diagram
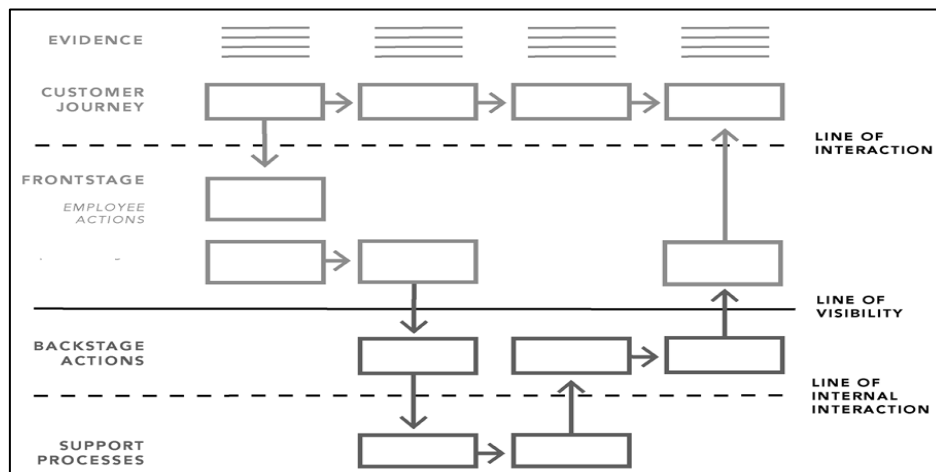
Source: nngroup.com

Service blue prints have three key lines (Figure 1):

- Line of interaction: Direct interaction between customer and the organisation
- Line of visibility: It separates service visibility above the line and backstage is below the line.
- Line of internal interaction: It separates employees who have direct customer contact and who don't have direct customer contact.

6.0 Big Data in Service Operations

Service firms are attentive on the collection and storage of enormous data to improve service efficiency. However, they are facing challenges to make complete use of such data. The challenges are summarised in Table 1.

Table 1: Big Data Challenges in Service Operations Blue Print

Aspects	Big Data	Service Operations Blue Print
Volume	Refers to the huge amount of data generated in services	Large data generated in service processes
Velocity	High speed of accumulation of data	Data flows from mobiles, social media, e-commerce platforms
Variety	It refers to nature of data, structured, unstructured and semi-structured	Diverse sources and various sensors used in services
Veracity	Inconsistency and uncertainty in data. Degree of accuracy/truthfulness	Sources of data veracity includes human error and data sources in services
Value	Data must be converted into useful information	Improving operational efficiency with insights, reports, analytics and statistics

Service companies are working on application of big data to get competitive advantage. Table 1 provides assistance to the managers for understanding where they could begin to incorporate big data and analytics across their service operations.

The use of simulation with statistics and visualisation techniques allows analysing customer needs on real time. It supports for developing strategic, tactical and operational decision-making for service operations (Chae *et al*., 2014). Service companies have to initiate total quality management, just in time and statistical processes to monitor quality of data in services.
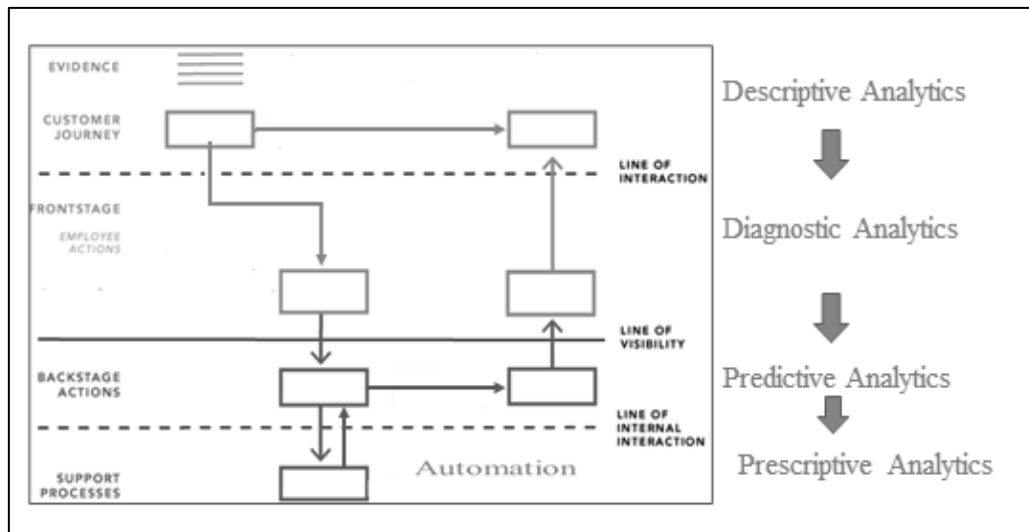
7.0 Innovations-Digital Transformation in Services Through Blue Print

Digital transformation through blue print will address the current customer issues and develop new services. It will address the need of consumer preferences, technology and competition. Example of Uber which has completely dominated the transportation sector, forcing other taxi service providers to discover ways to incorporate similar online app-based ride experience, ride-sharing, car on rent or other on-demand services into their business.

Digital transformation is setting new standards for service business growth. It is not just about incorporating newer technologies into business but it is a digital disruption, which requires restructuring everything in the business process and digital leadership (Lee *et al*., 2017). The numbers of connected devices from smartphones to cars to industrial automation to smart cities and its connection to humans is increasing. Organisations that deliver digitally transformed services will gain a competitive

advantage. Digital transformation is about rethinking the services and processes, digitalising systems, and delivering highly connected and contextual experiences for the end consumers. Major focus of service companies will be to provide better digital customer experience. Emerging technologies such as internet of things, machine learning, artificial intelligence, virtual reality, augmented reality, big data and cloud computing are changing the way services will operate in future (Figure 2).

Figure 2: Digital Transformation in Services

Source: Author's Model

Digital transformation strategy should clearly define about the business process change, cultural change, and technology change for service innovations (Kane *et al.*, 2015). Data is a critical element for business decisions. Perform analytics on customer data, operational data and performance data to take decisions for the future.

8.0 Case: A Service Company has Provided Data for Service Problems

Service quality is priority of companies and a company measures the defects in services to improve customer experience. Managers can use big data and analytics to find the problems in existing services and with analytical tools they can get insights for service improvements. Digital dashboards can be created to take decisions and improve customer experience (Table 2).

Table 2 : Data for Service Problems

| Service Quality- Problem	Count
Evidence	40
Customer waiting	330
Employee mistakes in services	270
Backstage Actions	30
Support Processes	40

Source: Vimo Foods Pvt. Ltd.

Customer service dashboard provides insights that are necessary to improve the customer experience and type of support service the provider can offer with people, process and technologies (Figure 3).

Figure 3: Customer Service Dashboard

Pareto Analysis- It is based largely on the "80-20 rule". As a decision-making technique, Pareto analysis statistically separates a limited number of input factors— either desirable or undesirable (Figure 4).

Figure 4: Pareto Analysis
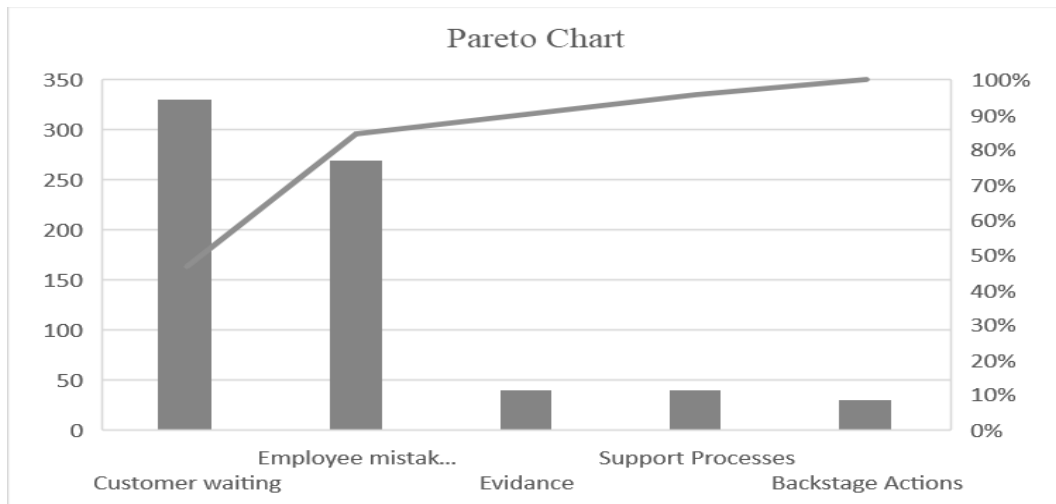
Doughnut chart express the relationship of 'part-to-whole' where all parts represent 100% when collected together (Figure 5).

Figure 5: Doughnut Chart
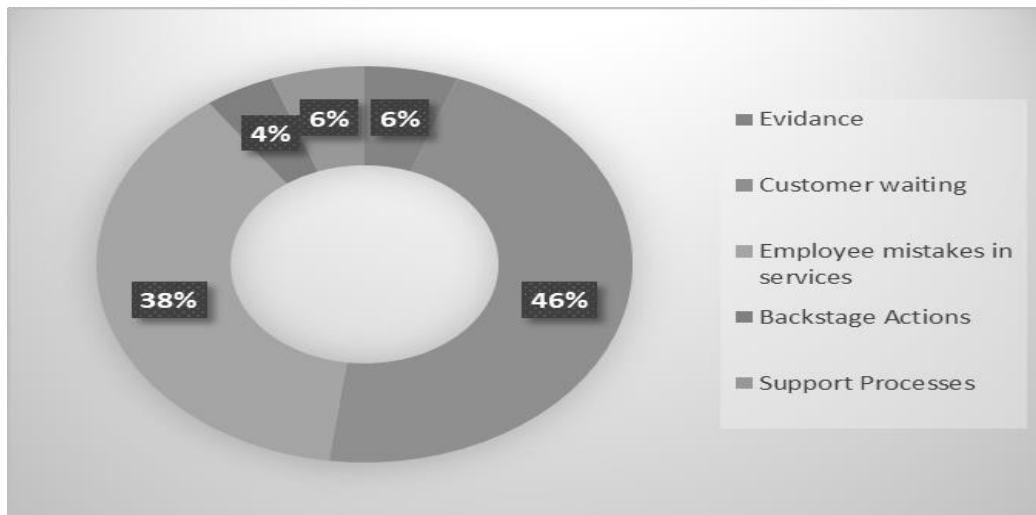
Area Chart is a graphical representation useful for visualising how one or more quantity can change over time, by plotting values or data points. It is helpful for showing

key performance indicators. Area charts are used for analysing trends and making comparisons.

Problem: To study service quality

Solution: The data is gathered from the service company and plotted with a simple area chart as given Figure 6.

Figure 6: Area Chart

9.0 Conclusion

This research paper clears that there are specific activities that can help organisations derive value from their data. Digital transformation can help organisations to accelerate value creation in services through blue print and analytics. Researcher has observed previous literature available on service blue print for developing new services and to identify problems in existing services. Researcher has discussed challenges of big data in service blue prints. To improve customer experience in services researcher has recommended digital transformation of services through blue print. Paper discussed how descriptive, diagnostic, predictive, and prescriptive analytics can be used in service blue print to improve customer experience and reduce service gaps. Case study explained service quality problems. Managers on the basis of dashboard can take decisions to improve service quality. In future work researcher will study different types of services with reference to digital transformation.

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