# Impact of Big data analytics on Innovation and Learning Performance

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#### Abstract

Big data analytics plays a key role in this era of fourth industrial revolution. However, the impact of big data analytics capabilities on innovative product development and employee development and finally on innovation and learning performance have not been thoroughly examined. To address the gap in existing literature, here research team draws on Dynamic capability view theory to conceptualise a theoretical framework. The unique contribution of this study is the theoretical framework and seven research propositions. Future research plan is to test the theoretical framework and suggest insights for supply chain managers.

## Keywords

Big data analytics, Dynamic capability view theory, Innovation, Learning

## 1. Introduction

Today's supply chains are exposed to dynamic business environments with higher level of uncertainties (Bag, 2017; Bag et al., 2018a). Every mining company is focusing on development of dynamic capabilities to mitigate risks and build competitive advantage. Mining companies are developing dynamic capabilities at two levels. Firstly, at the business process level and secondly, are the set of organization resources (Braganza et al., 2017). Business processes management aims to optimize structure, functions and organizational elements (Samaranayake, 2009). Every mining company can potentially optimize sales order process cycle, procurement process cycle, manufacturing execution cycle and logistics process cycle. Business process optimization can save significant amount of money and reduce the lead times resulting in enhanced customer satisfaction levels. Business process optimization also plays an instrumental role in conserving scarce natural resources (Kelle and Akbulut, 2005). Big data and analytics (BDA) tools can be exploited to reap significant business benefits (Gunasekaran et al., 2017). Big data is characterised by 5 Vs' (volume, variety, velocity, veracity and value). The unstructured data generated from social media, mobile devices, machines and sensors can provide valuable information for business insights (Wamba et al., 2017). BDA can be used for enabling plant automation in this age of fourth industrial revolution (Telukdarie et al., 2018). Existing literature shows lot of progress in the field of BDA. However, it fails to explain how BDA capabilities can influence the innovation and learning performance and finally impact sustainable supply chain performance. To extend the knowledge base, this study aims to answer two key research questions as follows:

RQ1: What are the impact BDA capabilities on sustainable supply chain performance?

RQ2: Can a model be developed for examining the moderating role of supply chain innovativeness?

## 2. Conceptual framework

Dynamic capability view theory has been used as a theoretical lens to study the proposed relationships.



Figure 1. Conceptual framework

#### 3.1 Research Propositions

In today's volatile environment absorbing external knowledge is the key to innovation. A key advantage in this changing environment is the availability of data from multiple sources for making business decisions. The large scale information source generated from low cost mass communication is known as big data. Big data can be traditional organisation data, social media data and data generated from machineries and sensors. BDA management capability is developed with the aim of covering the management aspects. Prospect identification, green product development, green product testing and green product launch are the different phases of new green product development process. New green product development projects are likely to fail without proper management of complex activities using big data. BDA management capability allows managers to accurately plan and execute green product development activities. BDA has created substantial opportunities for developing green product performance in the field. This will be beneficial for determining right marketing and operations strategies and further controlling costs in the supply chain. Organisations utilising BDA tools can adopt a proactive approach and make right move in the market before its competitors. New green product failures and uncertainties can be eliminated (Zhan et al., 2018). Therefore, research team hypothesize: *H1: BDA management capability is positively related to innovative green product development* 

Building the talent capability involves investment of time and capital in developing the skills for programming, project management, data and network management, maintenance and analytics (Akter et al., 2016). Such skills are necessary not only for developing existing employees but also developing leaders who plays an instrumental role in implementing big data architecture in the organisation. According to Marshall et al., (2015) leaders focus on innovation using big data and analytics within a structured approach and emphasize on collaboration. Therefore, research team hypothesize:

H2: BDA talent capability is positively related to employee development

Innovative green product development commences with the idea generation and ends with market launch of the green product. While developing a green innovative product for the mining market the environmental knowledge is shared among the environmental experts and innovative green product development (IGPD) team. The life cycle assessment of green material is conducted and the environmental database is made accessible to the team. Based on available information the environmental manager issues guidelines to the IGPD team and key component suppliers. The IGPD process implemented in a systematic way improves the innovation and learning performance. It allows discussions and analysis of errors and failures related to environmental new green product development projects using BDA applications in this firm, on all levels (Akgün et al. 2014; Silvestre, 2015). Employees are free to make suggestions and they have the willingness not only to do what the customer wants but offer something better.

Therefore, research team hypothesize:

H3: Innovative green product development is positively related to innovation and learning performance

Employee development is achieved through various training programs. In progressive organizations the top management support employees who wish to continue or upgrade their higher education/training. Developmental activities help the employees to optimize resource usage using BDA applications. Employee

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development improves level of knowledge and increases the incident of new green product development successes (Imran et al., 2018). Therefore, research team hypothesize:

H4: Employee development is positively related to innovation and learning performance

Supply chain innovativeness has the ability to strengthen/weaken the relationship between innovative green product development and innovation and learning performance.

Therefore, research team hypothesize:

H5: Firms with more (less) supply chain innovativeness have a greater (lower) level of innovative green product development for a given level of innovation and learning performance

Supply chain innovativeness has the ability to strengthen/weaken the relationship between employee development and innovation and learning performance.

Therefore, research team hypothesize:

H6: Firms with more (less) supply chain innovativeness have a greater (lower) level of employee development for a given level of innovation and learning performance

### 4. Findings



#### 5. Conclusion

The study conceptualises a theoretical model using DCV theory where the constructs considered are BDA management capability, BDA talent capability, innovative green product development, employee development, innovation and learning performance and sustainable supply chain performance.

The following paths are tested using structural equation modelling tools:-

Path 1: BDA management capability on innovative green product development: Supported

Path 2: BDA talent capability on employee development: Supported

Path 3: Innovative green product development on innovation and learning performance: Supported

Path 4: Employee development on innovation and learning performance: Supported

Path 5: Moderating role of supply chain innovativeness on the relation between innovative green product development and innovation and learning performance: Supported

Path 6: Moderating role of supply chain innovativeness on the relation between employee development and innovation and learning performance: Supported

The key take away for supply chain managers to improve supply chain sustainability in this digital age are as under:-

- Focus on developing BDA management capabilities
- Focus on developing BDA talent capabilities

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- Focus on BDA driven innovative new green product developments
- Focus on BDA skill development among existing employees
- Focus on innovation, learning and knowledge management for applying artificial intelligence based expert systems in planning and control of logistics and supply chain operations
- Passion for achieving sustainable development goals

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#### **Biographies**

**Surajit Bag** is currently pursuing higher research studies under University of Johannesburg in the area of Engineering Management. He has attended several National and International level conferences. His articles are in the spotlight with 381 citations, h-index 11 and i10-index 11 (Source: Google scholar). He is an Editorial board member of *International Journal of Applied Logistics, IRJ Science and Amity Journal of Operations* 

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