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EXPLORING THE ROLE OF BUSINESS INTELLIGENCE SYSTEMS IN THE ERA OF TEXTILE AND APPAREL INDUSTRY 4.0

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Abstract

. The studies have just intensive on the outlook of big data process in Industry 4.0 and ignored the role of commercial intellect systems (BIS), specifically in the T&A industry. Industry 4.0 is a fresh era of industrial rebellion in which textile and apparel (T&A) firms are approving and assimilating advanced technologies to realise sustainability and a competitive edge Results: The findings exposed various refrains, such as sustain expertise issues in T&A companies, and supposed complications in the acceptance of BIS. The results show the key role of fiscal sustainability in the acceptance of BIS and Industry 4.0 technologies in T&A companies.

Key words: Business Intelligence Systems (BIS), Textile and Apparel (T&A) industry

Introduction

The textile and apparel (T&A) industry looks challenges such as competence, sustainability, and quick response to clients' self-motivated necessities as well as product quality and regulatory compliance which ascertain its survival. In addition, the industrial ecosystem, global sustainable professional trends, and consumer-driven economy put burden on industries to become more sustainable, innovative, and responsive because consumers, especially generation Z consumers, are more eco-aware and eager to remuneration for eco-friendly pr ducts.

To date, much research on corporate sustainability has attentive on consumers' inclination to provision and buy sustainable products, which are identified by service, quality, and price. Therefore, the T&A industry needs to achieve cleverer in the fourth industrial revolution or "Industry 4.0" by focusing on the triple bottom line approach.

The conception of sustainability must be addressed in terms of the T&A industry's main executive processes (e.g., production, manufacturing, retail, delivery, purchasing, and customers), as well as its relationship with suppliers, distributors, and customers. According to Trieu, the race towards Industry 4.0 persuades manufacturing to integrate digital skills, such as

Internet of Things (IoT), radio-frequency identification (RFID), robots, augmented reality, additive manufacturing, and cloud technology.

Consequently, this study objective to narrow these breaks and answer the following research questions:

• How do concerns reach their verdicts to adopt BIS? What are the sustainability issues in the T&A industry that lead to the adoption of BIS in the era of Industry 4.0?

• How can T&A concerns advance value creation procedures to keep their sustainability through the integration of BIS under the Industry 4.0 concept?

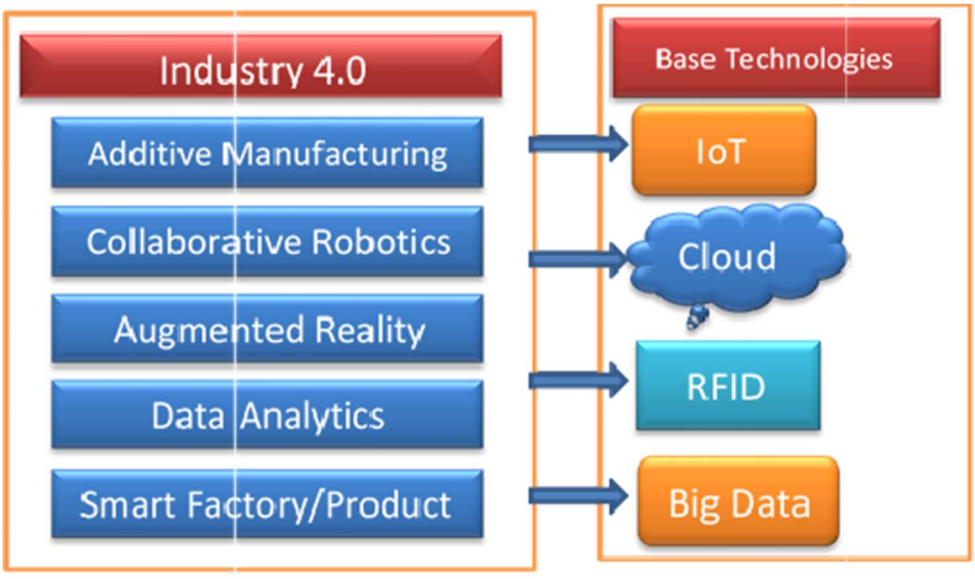
• What are the obstacles in the adoption of BIS under the Industry 4.0 concept in T&A industry?

The study findings will director industry authorities and academicians to achieve better insights with the help of BIS for improving the sustainability in T&A industry under the Industry 4.0 concept.

Industry 4.0

The current Industry 4.0, with creation characteristics of cyber-physical systems (CPS), includes knowledge integrity with usage of heterogeneous data. The idea of Industry 4.0 was originally proposed for the development of the German economy in 2011. The CPS of Industry 4.0 is based on key technologies (Figure-1) to enhance the efficiency and effectiveness of the entire industry. Industry 4.0 includes many technologies and associated systems, including enterprise resource planning (ERP), radio-frequency identification (RFID), Internet of Things (IoT), cloud computing, additive manufacturing, augmented reality, and collaborative robotics with machine learning and big data.

Figure-1. Industry 4.0 framework with base technologies



Enabling Role of Industry 4.0 Technologies for BIS adoption, Big data, cloud computing, IoT, mobile computing, and RFID play a significant role in Industry 4.0; its characteristics with base technologies 2.3. Gartner Group surveys confirmed that almost 80% of USA companies and 50%

of European companies have integrated BIS. BIS are used in multiple departments of industry (manufacturing, production, supply chain management, inventory management sale, marketing, retailing, finance, etc.) to support marketing campaigns, monitor the behaviours of customers, and analyse profitability of products.

The supreme regularly operated BI analysis reflects the value of BIS:

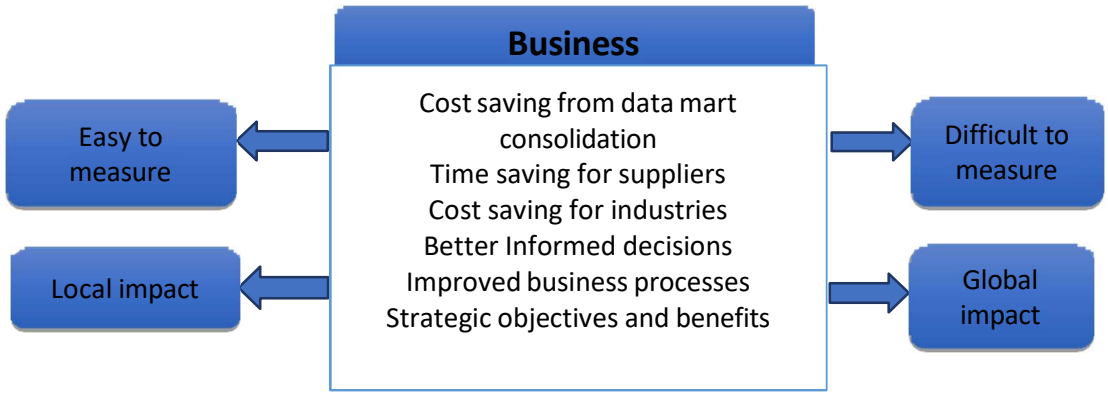
(1) Forecasting of strategic business processes development;
(2) Credit scoring;
(3) Web and text mining;
(4) Logistics optimizations;
(5) Analysis of customer loyalty;
(6) Upselling and cross selling analysis;
(7) Profiling and customer segmentation;
(8) Fraud detection;
(9) Survival time analysis and limits importance analysis

The most important advantages achieved by BIS adoption were the following:

- Obtained quality information for decision-making (95%)
- Enhanced ability to analyze the expected opportunities and threats (83%)
- Improved organizational knowledge (76%)
- Improved information sharing (73%)
- Better analysis and information retrieval (58%)
- Improved efficiency (65%)
- Faster decision-making (54%)
- More accurate and quick reporting (82%)
- Enhanced quality of decision-making (78%)
- Improved customer services (58%)
- Escalate revenues (49%)

The most of the perceived benefits are intangible because they are difficult to measure. A broad array of possible benefits attained by the integration of BIS is shown in Figure 2.

Figure 2. Benefits of business



According to the research and other studies endorsed, that suitable vendor selection is very important in order to attain the great success of BIS adoption.

- **How do concerns reach their verdicts to adopt BIS? What are the sustainability issues in the T&A industry that lead to the adoption of BIS in the era of Industry 4.0?**

Major sustainability challenges in T&A case companies generally, the major problems faced by T&A companies were long product lead time for fashion items, short product cycle, and forecasting issues for fashion articles. Another issue was the elimination of a quota to international markets in 2005, which created a critical challenge for effective sustainability in T&A companies. The IT executive of the some companies also stated: "to adopted Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Customer Relationship Management (CRM), and Human Resource Management (HRM) systems to strengthen the supply chain, marketing and international customer's satisfaction. Now, the company is ready to adopt BIS to aggregate and analyze data from internal systems such as ERP, CRM, HRM and SCM as well as external sources from market and web, etc.".

- How can T&A concerns advance value creation procedures to keep their sustainability through the integration of BIS under the Industry 4.0 concept?

The era of Industry 4.0 directed the industries to implement and assimilate digital technologies such as IoT, RFID, robots, BIS, augmented reality, additive manufacturing, big data, and cloud technology to maintain its sustainability. Significant value creation processes are short lead time, efficient supply chain, and fast delivery of products, fast merchandising, fast customer insights, quick order fulfilment, customer loyalty, and inventory management.

"The adoption of BOBJ solution not only improved the company's production forecasting, retailing, and financial processes but also enhanced the company relationships with suppliers and customers. As a result, company is expanding and growing across the world at great pace". The lead time reduction can be possible through fast product delivery and product inventory with the help of RFID. Oracle BI solution to stunned challenges such as stays in production and transfer orders.

- What are the obstacles in the adoption of BIS under the Industry 4.0 concept in T&A industry?

It is a fact that T&A companies are enjoying the benefits of BIS and Industry 4.0, but the informants also observed some barriers that might affect their adoption decisions. The main barriers are:

- **Cost and complexity**

The five informants confirmed: “The BIS and the Industry 4.0 technologies are complex and costly in terms of implementation, maintenance and updating. They would directly affect the merchandising cost at article level”.

- **Vendor support**

Another concern is the vendors’ support. All interviewees confirmed: “Most of the vendors are not supportive and are unable to demonstrate the exact time and budget for costly project of modern technologies. Consequently, technologies take unexpected duration of implementation and directly increase the cost and chances of technology failure”.

- **Top management support**

Six interviewees stated: “Top management support is very necessary for innovation adoption such as expensive BI solutions and Industry 4.0 technologies in terms of funding, rewards and raining, etc. The attitude of the top management was a challenge for them to influence top management for modern technologies integration. Therefore, it is imperative to get support from top management for project investment and encouraging the sta_ to use newly implemented systems”.

- **Technical skills and expertise**

Another important concern of all the informants was technical skills and expertise. Technology implementation always needs well-skilled experts for proper adoption. Good human capital is very important for adoption of the latest technologies in companies. This is also evident from this statement from eight informants

- **Integration with existing systems**

Three informants stated in this way: “The BIS and emerging technologies’ integration with existing systems and technologies is another significant obstacle because the BIS with single database provide only restricted advantages to the companies”. Four informants stated: “the combination of gadgets from many hardware suppliers, variety in components ‘openness, multiple communication protocols and characteristic intelligent standards are major barriers for the implementation of Industry 4.0 concepts in companies”.

- **Change management**

When we integrated the BI solutions and 3D technology in our company had overcome this issue with change management strategies in terms of trainings and rewards. Another three moles stated: “the employees are rather reluctant to use new innovation or new techniques. So, they would expect the proper training and support by company, and continue support from vendors companies as well”.

Conclusion:

All technologies make substantial aids to pretty the sustainability in T&A by improving supply chain management, inventory management, marketing, fast merchandising, quick shipments, retailing, and distribution methods which effect in optimization of a company's business, customer satisfaction, and cost saving, and generating high revenues. Results of this study show that retail companies are more ready to enter the fourth industrial rebellion rather than only textile companies. Furthermore, major barriers such as cost and complexity, vendor support, top management support, technical skills and expertise, integration with existing systems, and change management also emerged. All perspectives of the current study should be considered seriously by policymakers and strategic managers of manufacturing companies before entering in the fourth industrial revolution.

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