

Review Article

Investigating the Analytics for Workforce Automation

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Abstract - The increasing data and the persistent aspiration to stay in front of the competition have encouraged organizations to emphasize enabling analytics in managing the workforce. The exploratory study aimed to explore the impact of analytics in digitizing the firm's workforce. The research paper's emphasis was to examine HR analytics implementation issues in workforce management—this research paper employed qualitative research. An in-depth interview tool was used for the primary data collection from the HR heads of 15 organizations, namely online companies in Retail, consumer goods, industrial goods, automobiles, financial services, consulting, and five experts from academia. The study's findings led to proposing a framework for the emerging use of analytics in the firms. The study may benefit the industry by incorporating the HR analytics framework suggested in the paper. The academia may extend the research for describing analytics for resource allocation. The study is original as it proposes a framework that can use analytics to automate the organization's workforce.

Keywords - Analytics, online, Automation, Workforce.

1. Introduction

Business analytics makes the managers identify their corporate dynamics, expect market changes, and accomplish risks. The companies combine analytics and logical, statistical thinking to create results that increase productivity, risk control, and profits. Digitization has changed the workforce at a faster pace. Force 4.0 is about adopting new job roles and understanding the changing work landscape with more digital technology penetrating the workplace. Many organizations were deploying data analytics initiatives to generate useful ideas catering to competitive benefits (Mikalef, 2020; Constantiou, 2015). An efficient, talented, and productive workforce was considered the most valuable organization's most valuable asset (Likhtikar&Verma, 2020; Biswas &Varma, 2011). Original strategic methods for complete human resource management were required in businesses that deal with information and challenges communicated to innovative advanced tools and industrial processes (Jha&Sareen, 2017). Interest in Human Resource Management analytics has increased dramatically among researchers and professionals (Boudreau and Cascio, 2017; Daveport Harris and Morison, 2010; Guenole, 2017).

The most significant chunk of expense in any organization was on the workforce. Thus it was apparent that workforce-related decisions affect any business's performance (Qureshi 2020). The link between HR practices and business outcomes was analyzed using analytics for the said purpose. Big data analytics is an emerging technology and architecture meant to mine the information from vast volumes of data and lead to analysis (Mikalef et al., 2018). Due to rapid advancements in the environment and technology, traditional HR metrics were unsuitable for different events (Sharif, 2015). The

transformation occurs, and HR analytics plays an essential role in exploiting possible opportunities and handling varied, complex challenges (Ben-Gal, 2019). Human resource analytics was too famous as workforce analytics, talent analytics, people analytics, etc. Human resource analytics could be understood as applying advanced data mining & analytics tools and technique in HR (Vihari & Rao, 2013).

There are three primary purposes for implementing analytics in people management domains in an organization (Ben-Gal, 2019). First, its use was in gathering data for predicting long & short-term demand & supply of the workforce (Kapoor &Sherif, 2012). The second purpose was to support organizations with useful insights about managing people to attain desired business goals quickly & efficiently (Hota& Ghosh, 2013). The third purpose was to encourage the effective execution of organizational strategy (Heuvel&Bondrouk, 2016; Huselid, 2015). Analytics techniques were broadly classified into three categories such as prescriptive, descriptive, and predictive. Human resource analytics combines human resource data and different sorts of statistical analyses, including modeling techniques, prediction, data mining, etc., to focus on deriving understanding and exploring new insights about the business and its expected performance.

Marr (2016) mentioned in their work that despite sufficient investment, various organizations fail to outperform market competition using significant data analytics investment. It is being observed that despite enthusiastic Big Data investment, the outcome differs significantly in success reference. (Bean et al. 2017). Rasmussen & Ulrich (2015) mentioned that minimal studies from the past support the decision-makers to adopt HR analytics. Apart from these, minimum reviews on HR



analytics were found from Asia, as Ben-Gal (2019) found only 13% of studies on HR analytics from the Asian continent. Professionals at the workplace were not sure about tools for answering specific questions to deal with people-related challenges in the workplace and were not confident about adopting the technology front (Marler & Boudreau 2017; Strohmeier 2018).

Based on the above research gaps, the presented study explored analytics in workforce management and HR analytics' different issues and challenges in various organizations. The study also intended to propose a framework for emerging analytics in the digitization of the workforce. The presented research article includes a literature review, research methods, data collection techniques, and analysis. It further showed a detailed understanding of the investigation, study implication, limitation, and future research opportunities with a decision.

2. Study Background

The evolution of data analytics in the last decade emerged with different themes. Various academic models were also developed to adopt HR analytics by professionals (Fitz-enz, 2009; Boudreau and Ramstad, 2007; Boudreau and Jesuthasan, 2011). For the business strategy's competitive advantage and success, its workforce capabilities are considered driving forces (Agrawal, 2008). These days, organizations focus on job designs, empowerment of people, workforce analytics, teamwork, quality rules & competitive compensation packages than traditional HR functions (Mehta and Mahajan, 2012).

Workforce analytics is the essential method that supports HR practitioners in handling the workforce meritoriously. Workforce analytics generally included measuring staff efficiency, offering clear evidence for decision-making, and improving firms' ability by identifying the workforce management processes (Hota & Ghosh, 2013). The current trend of analytics of people-related issues was more of a reactive nature than to be proactive (Huselid, 2015). HR analytics was still a less explored topic in human resource research. Thus more studies about its implication and consequences would be beneficial. By contrast, vigorous competencies denote "the organizational potential to decisively produce, encompass or change its source base" (Helfat 2007).

The present study is based on resource-based viewpoint theory (RBV), as the resources were considered the major determinants of organizational performance. The resource-based view (RBV) theory (Barney, 1991) offered a meaningful explanation of the interaction between an organization's strategic properties and its ability to achieve economic improvement (Taylor, 2009; Hitt, 2016). It described a path for securing economic progress through concentrating on resources. A firm operates within the internal and external business environment, including easily controllable inner strengths-weaknesses of an

organization and external opportunities-threats (Grant 1991).

This theory explains attaining sustained competitive advantage by focusing on the internal strengths and weaknesses (Grant 1991; Foss and Eriksen 1995). As per the idea, if an organization is to achieve ensured competitive benefit, This must obtain valuable, rare, inimitable, and non-substitutable (VRIN) potential and resources to absorb and apply the resources (Barney, 1991). The presented study explores the application of digitized human resource practices for implementing workforce analytics and considers it a strategic resource of the organization for attaining competitive advantage.

2.1. Usage of analytics in the Workforce domain

Different conceptual studies on HR analytics mentioned the strategic significance of HR analytics and discussed their tools (Bose, 2015; Ryan and Herleman, 2015; Sharma, 2015; Zang & Ye, 2015; Ulrich, 2016). Traditionally, analytics was used to study turnover rate and hiring costs; however, few predictive modeling approaches are being used to analyze the possible impact of people's policies on business and forecast the workforce's future behavior (Aswale & Mukul, 2020). Various researchers mentioned the use of analytics in recruitment and selection (Tamizharasi et al., 2014), training & development (Tamizharasi et al., 2014), Talent management (Tamizharasi, 2014, Malisetty, 2017 ;) enhancing loyalty towards business (King 2016), and employee sentiment analysis (Manogna & Mehta, 2015).

Different data analytics tools were used in the Industry, including descriptive and predictive analytics such as decision tree, neural network, logistic regression, classification, clustering, associated and prediction rules, metrics analysis, conjoint analysis, clustering algorithms, etc. (Likhitar & Verma 2020). For performing descriptive analytics in the workplace domain, various tools such as business intelligence (BI), benchmarking tools, graphs, charts, Key performance indicators based scorecards, dashboards, and advanced survey analysis techniques were used (Ben-Gal, 2019).

The widely used predictive modeling techniques are regression, time series analysis, parametric modeling, decision tree, deep learning, Discriminant analysis, and neural network (Ben-Gal, 2019).

The applications of predictive analytics in workforce planning, recruitment & selection yield high return on investment (Fitz-enz, 2009). In recruitment and selection, specialized data analytics is being used for screening candidates during the hiring process (Angrave, 2016; McAbee, 2017). In this process, software sorted through job applications, including social media sources, reducing administrative expenses (Hamilton & Sodeman, 2020). In hiring, psychometric tools, algorithms, decision trees, classification, and regression tree (CART) algorithms are also used (Azar et al., 2013, Sivaram et al., 2010). In such

an uncertain situation, the organization's requirements to go away from the system to more dynamic potential (Benner & Tushman, 2003).

During talent management, training & development related HR functions, different analytics tools such as taxonomy, decision tree, clustering, neural network, association, and prediction norms (Tamizharasi et al. 2014, Manogna et al. 2015) are used. For performance management systems, analytics professionals generally use work quality, quantity & efficiency, and organizational performance. Similarly, for compensation & Benefits, tools such as conjoint analysis, workforce analysis, and experience fitment grid are used. Apart from this, for employee retention, clustering algorithms, resignation record metrics, etc., are used (Likhitkat&Verma 2020). Aswale&Mukul (2020) & Harris et al. (2011) worked on predictive analytics to study the impact of demographic and psychographic variables on attrition.

Waters et al. (2018) discussed the pros and cons of using different data sources, such as social media, video analytics, product sensor data, etc., for workforce-related analytics. Hamilton & Sodeman (2020) suggest non-HR-related data sources like social media analysis, video analytics, and the IoT (IoT). Like LinkedIn, social media is a common source of analytics data sources for screening profiles (Davison et al., 2012). Video analytics could monitor employee discipline (Austin, 2018), and star performers could be identified at workplaces using video analytics. They could be called role models during training sessions. In service industries, customer service with pleasant body language could be monitored and linked with compensation and reward practices (Hamilton & Sodeman, 2020). Internet of Things-based analytics could monitor the quality of products manufactured by employees of different plants. (Hamilton & Sodeman, 2020; Saarikko et al., 2017). It would help prepare the plant-wise training module and link employee performance to profitability.

2.2. Challenges of using analytics in workforce management:

Using analytics in the workforce domain is not free from challenges, and successfully practicing analytics among the workforce in regulatory & ethical challenges must be addressed (Hamilton & Sodeman, 2020). Qadir & John (2019) mentioned various challenges faced by a team of people management in implementing HR analytics, such as high cost of the software, data quality, and acceptability of HR analytics among the group, lack of data management skills among the team members, and lack of attainment of purpose through data analytics. The HR-related data captured by professionals at organizations sometimes lacked operationalization (Cappelli, 2017; Waters, 2018).

The people responsible for data collection might not collect it from the HR strategic perspective (Lee, 2017; Watson, 2014). A strong focus on the relationship between

HR professionals and IT managers needs the hour (Corte-Real, 2017; Janseen, 2017). Various HR professionals were not well qualified to analyze the data (McIver et al. 2018). Most of the Time, HR professionals lack a basic understanding of data for different purposes, such as research methodology, construct reliability, and validity (Janssen et al., 2017). They lacked insights about strategic usage of other variables or aspects of data, as they were not trained data scientists (Waters et al. 2018). Apart from it, the Employee related data was used in cross-functional domains. However, sharing data from one department to another sometimes becomes a challenge (McIver et al., 2018; Roberts, 2016).

Some companies developed a tracking system for collecting information like geo-location, audio collection, an accelerometer, and many more data from organizational employees during their working hours (Heath, 2016; Shell, 2018; Sheng, 2019), identifying productive actions and knowledge sharing among the team members. However, it may include challenges related to privacy concerns and data protection regulation issues. Research has suggested creating self-governing units with autonomy, empowering team members to adopt a group strategy (Sharma, 2020). Bernstein, Bunch, Canner, and Lee, 2016; observed that change from managed to autonomous teams generated dramatic results at Volvo (service errors reduced by 90%), FedEx (defects reduced by 13%), C&S Wholesale Grocers (created 60% cost-benefit over a competitor) and General Mills (productivity increased by up to 40%).

It has been seen that HR professionals focus more on saving administrative costs than enhancing overall firm profitability (Hamilton & Davison, 2018). Ratanjee and Dvorak (2018) focus on three critical elements of successful implementation, expectation clarity, connection to purpose, and cutting red tape. Every firm may have different strategic questions to answer through analytics for managing the workforce (Hamilton & Sodeman, 2020). The firms operating for better product quality or logistics might work on finding possible incentive packages or flexitime strategies, respectively (Hamilton & Sodeman, 2020). Similarly, for innovation, outgoing senior employees' reskilling opportunities may be looked at through analytics.

3. Objectives

The previous studies depict the gap between not knowing the analytics issues and the framework that can be followed in implementing analytics in the workforce. This research study aims to understand the problems and challenges of using workforce analytics in workforce management. Further, the paper presents the framework of emerging analytics in the workforce.

4. Methodology

The paper carried out Qualitative research, and the in-depth interview tool is used for data collection. The sampling area is India. The open-ended questions were asked from the HR heads of 15 organizations based on

purposive sampling, namely online companies in Retail, consumer goods, industrial goods, automobiles, financial services, consulting, and five experts from academia based in India. The goal of data collection from practice was to provide research alignment between practice and theory. The literature works by previous researchers were examined on the theory of dynamic capabilities. The data collection was based on two groups in the interviews: one from academics present in analytics education and two from HR heads practitioner. Our interview with the academicians was usually one hour long and was conducted via video conferencing. The literature was used, feedback from the academics to form the interview questions in Table 1. Finally, to ensure that the findings from the current literature reflected practices and to increase the generalizability of the paper's suggestion, fifteen HR heads were interviewed between May 15 to June 30, 2020, between the COVID-19 pandemic (details of titles and industries are available in Table 2). The interview with HR head professionals was conducted through videoconferencing and continued for one hour. The interviews completed both extant literature and our conceptualization of a dynamic workforce. The study findings (quotes) of the compelling force are provided in Table 3. The further analysis of the data was done by using Atlas.ti8.

5.1. Issues of Using Analytics

The analytics applications are underutilized in the organizations, and HR heads face problems in upskilling their resources. The HR also faced difficulties accepting analytics as the employees were quite comfortable using the traditional workforce management model. The HR heads admitted that the benefits of analytics need to be taught to the employees. Organizations like consumer durable goods use analytics for better Employee and channel partner management. The retail company heads also admitted that the company has started adopting the analytics, but the old employees are reluctant. They are keeping rewards for the effective use of analytics in the workforce. Other financial services and consulting technology are highly accepted in the Employee's functions. The engineering/logistics and industrial manufacturers also are open to limited analytics use. The food ingredient company was reluctant to use analytics as it created confusion in the organization. They feel that the introduction of result-driven processes may help them examine the shift in the company for workforce management. However, they are making use of sentiment analysis. In automobiles, the employees are managed through analytics, but they find complete acceptance in their organizations. The academic experts suggested that adopting analytics in India's sectors may take another 5-10 years as businesses are still using physical outlets only. The developing companies are shifting to e-commerce platforms and using digital presence.

5. Analysis

Table 1. Interview questions

1. How has workforce productivity developed in your company in recent years?
2. What kind of changes did you observe in the business environment that has been a driving force for digitization and analytics in your organization?
3. What different tools and techniques do you use to implement digitization using workforce analytics at your workplace?
4. What all benefits do you experience after implementing workforce analytics in your organization

Table 2. HR Heads and type of industry

Title	Experience (in years)	Industry/Academy
HR Manager	15	Medical Devices
HR Director	35	Consumer Durable
HR HEAD	20	Consumer Goods
HR director	35	Consulting
VP-HR	30	Online Retail
HR Manager	16	FoodIngredients
Senior Manager-HR	18	Automobiles
HR Manager	14	FinancialServices
HR Senior Executive	12	Engineering/Logistics

General Manager-HR	25	FashionGoods
HR Manager	18	Pharma
General Manager-HR	25	Hardware/Software
VP-HR	28	IndustrialManufacturer
Senior Manager-HR	23	Consumer Durable
General Manager-HR	35	Consulting
Professor	28	Business School
Director	33	Engineering Institute
Associate Professor	15	B School
Professor -HR	25	University
Professor—Analytics		B School

Table 3. Selected quotes (unstructured data)

Title	Quotes
HR Manager, Financial Services	There is some very talented resource with us; however, retaining them is tricky. 'Employee productivity depends upon various intangible factors, and if they are taken care of well, the productivity can be enhanced.'
HR Senior Executive, Logistics	Productivity requires skills and the retention of employees. The skilled employees do not stay for long, and the others take a lot of time delivering expected results.
HR Manager, Food Ingredients	Our employees need to be customer friendly and available to offer a personalized experience to retain customers. 'Use of digital devices at the workplace hampers productivity.' Sometimes, employees' nonserious attitude and indiscipline force them to implement analytics techniques for gauging real-time performance. It helped in Understanding the workforce better through sentiment analysis.
HR manager, Pharma	'Explain the gap between Employees' expectations and organizational expectations.' To understand the issues related to work-family conflict and find out solutions. It helps in finding the reasons behind a lack of employee productivity.
VP-HR, Industrial Manufacturer	Understand the Employee's sentiments and redesign HR practices and policies to match the Employee's expectations. Implementation of innovative HR practices Helpful in managing performance Self-governance of teams.
General Manager-HR, Consulting	'Process analytics tools and integrated analytics tools are some of the tools used to implement digitization by using workforce analytics.'
Professor, B School	'Support Better visualization of work processes,' Saving time and effort in understanding people.



Fig. 1 (Word cloud of the responses)

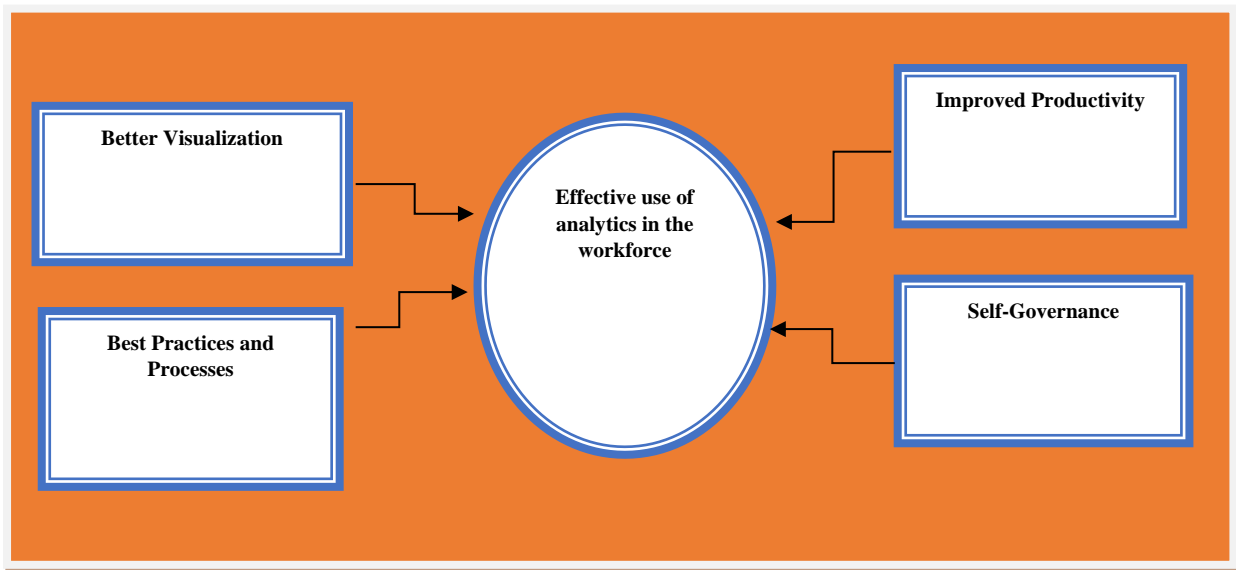


Fig. 2 Framework for effective use of analytics in the workforce

6. Findings

The study analyzed the workforce analytics practice in understanding employees and improving their productivity. Few of the companies had HR partners also for the implementation of data-driven decisions. The visualization enables self-governance and policy improvement in organizations. Besides redesigning digital platforms, gauging the employee experiences, recognizing skill gaps, retention, personalization, and sentiment analysis, innovating delivery is made possible by using HR analytics. The suggested framework can benefit the corporate in its execution of HR workforce management.

The Word Cloud indicates that HR analytics is crucial for understanding employee expectations and improving productivity. The dynamic capabilities of analytics are visible. The decisions related to organizational workforce management become more comfortable with the insights of HR analytics. The four factors are presented in the form of a framework for using HR analytics to improve the workforce, namely better visualization, improved productivity, Self-Governance, and Best practices and processes.

7. Limitations

The study recommends that even with team structures, the organization needs to go away from process-oriented team management, where the manager decides on function and team structure. The study was limited to a few organizations to study workforce automation.

8. Practical Implications for Asian Business

The Asian businesses may exploit the findings to create team structure within traditional workforce matrix organizations. The Firms may develop the expectations clarity that emphasizes constant communication and real-time evaluation of teams. The study may help the academicians to further their research. HR in Asian firms may adopt the Analytics based framework for effective workforce management. The workforce in organizations in Asia becomes much more structured and well managed due to their organization's visualization with the framework's help. The factors derived in the study can be best utilized for maintaining the work automation in the organization. The Employee's management becomes effective if the gaps of less productivity are clear. The HR analytics enable the organization's predictive, descriptive, and prescriptive capabilities. The HR of a financial services firm emphasizes that employee productivity depends upon various intangible factors, and if they are taken care of well, the productivity can be enhanced. Eventually, people are the most valuable, expensive asset of an organization; due to this reason, most organization wants people analytics in their critical analysis; therefore, this paper provides a clear understanding of the gap that HR should fill and provides insight into HR data. Nowadays, every giant organization is cultivating analytical competencies that support the organization's day-to-day operation; thus, this research paper enables an understanding of the challenge related to managing the organization's function concerning people analytics. Keeping the effectiveness and impact of people as the most valuable organization assets, this paper provides an understanding of crucial steps applied in people analytics. HR is witnessing the beginning of two major fields: big data and people analytics. With the help of HR analytics and big data, an organization is more proficient in taking more accurate decisions for the organization's productivity. This paper supports people's analytics and organization decisions to become more encouraging and perfect. This research paper discusses by enabling the people analytics organization may be benefited in various facets of organization HR day to day operation like progress retention, amplified recruitment, more motivated employee performance, develop better compensation and incentive initiative, creating real change in organizational

culture, expanding employee engagement, empower better human resources planning and encourage better employee development. The result of the research paper signifies that by enabling people analytics, the organization can become more predictive throughout time. Organizations can analyze by using the organizational data, which is the top performer assets of the organization, which HR initiative impacts more on the organization's performance and the process of the organization, not only this it also helps to identify the rare and most useful talent of the organization. These research papers provide a much-needed HR analytics framework usage, as most of the time, the user data is disseminated and unused in the absence of a proper HR analytics tool; due to this reason, a desirable HR analytics framework like HR analytics & big data could use to understand the useful information and transform this into useful statistics. Generally, analytics are practiced to determine the influence of workforce metrics on organizational productivity. Therefore this paper may provide insight into HR analytics in making operations more automated with real-time feedback and effective organizational performance. The organization may implement HR analytics to empower the HR managers to enhance their operation and decision-making based on its people-oriented data. This HR analytics helps HR professionals execute preplanned analytics to help enhance HR performance by improved hiring, retention, and objective-based performance management.

9. Conclusion

The resilience of the organization becomes pertinent to the use of workforce analytics. This usage of human resources analytics flexibility leads to designing a useful HR analytics framework for better workforce management by the companies. We practiced the present research and interviewed heads to recommend that HR analytics emphasize improvements in four areas: Improved productivity, Self-Governance, better visualization, and best practices and processes in the workforce. The agile management of HR is possible only through the effective use of HR analytics. It helps HR professionals to regulate the HR processes and data-driven decisions and improve ROI. It helps leaders make decisions to create better work environments and maximize employee productivity. It makes a significant impact on the bottom line. The right structure and proper strategy implementation of an effective workforce were developed.

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