

Critical Assessment on Performance Management Systems for Health and Fitness Club using Balanced Score Card

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Abstract

Web science, a general discipline of learning is presently at high demand of expertise with ideas to develop software-based WebApps and MobileApps to facilitate user or customer demand e.g. shopping etc. electronically with the access at their smartphones benefitting the business enterprise as well. A worldwide-computerized reservation network is used as a single point of access for reserving airline seats, hotel rooms, rental cars, and other travel related items directly or via web-based travel agents or via online reservation sites with the advent of social-web, e-commerce, e-business, from anywhere-on-earth (AoE). This results in the accumulation of large and diverse distributed databases known as big data. This paper describes a novel intelligent web-based electronic booking framework for e-business with distributed computing and data mining support with the detail of e-business system flow for e-Booking application architecture design using the approaches for distributed computing and data mining tools support. Further, the importance of business intelligence and data analytics with issues and challenges are also discussed.

Keywords:

big data, business analytics, data mining, data science, e-Booking, e-Commerce, web science.

Acronyms Used:

24/7	24 hours a day, 7 days a week (Any time, Every day)
AI	Artificial Intelligence
AoE	Anywhere-on-Earth
BI	Business Intelligence
DBMS	Data Base Management System (Software)
DDBMS	Distributed Database Management System
E-Booking	Electronic Booking
E-Business	Electronic Business
E-Commerce	Electronic Commerce
IBE	Internet-based e-Booking Engine
IoT	Internet of Things
ML	Machine Learning
MobileApp	Mobile Application Software
OOHMD	Object Oriented Hyper Media Design
PDA	Personal Digital Assistant
ROI	Return on Investment

1. Introduction

This research aims to gain insight into various performance management models and analyse different performance measurement tools and techniques to propose a combination for Well Fit, a thriving health and fitness club chain in U.K. Through an extensive literature review and a systematic perception of various performance appraisal models, in order to justify the proposed appraisal technique of Balance Score Card for Well Fit in order to achieve vertical integration and horizontal integration in the organization. The alignment of the organization's goal all over the structural hierarchy to reap the rewards of real time feedback and benefits accordingly is paramount besides sheer assimilation and coordination among various departments like recruitment and selection, compensation and benefits, performance appraisal, training and development, succession planning and management and career development, categorically being wedges of performance management system.

The model being favoured by a list of successful organizations and industries for more than a decade through alignment of the mission at every level, enlightens the business world. Precisely, one of the valuable tool of performance management system has been evaluated through this paper to shatter light on some imperative techniques of performance appraisals along with minimizing errors in the system to ensure effectiveness of performance reviews. The study further reveals the impact of culture and change on performance explained through various models and techniques.

At the same time discussing the value of strong culture of change leadership appropriate to achieve further expansion of business and accomplishment of the profitability goals of the fitness club.

2. Literature Review

A literature pursuit on a systematic criticism on the performance management designs, approaches, models and techniques while selecting the best fit appraisal scheme for the health club ultimately creates the proposition through deductive reasoning. Through a range of historical confirmations around appraisal tools, implications of cultural aspects and change governance on individual and organizational performance and selection of a robust performance technique for a thriving business. It is of utmost value to understand performance appraisal as a serving of performance management system.

According to McAdam, R., Hazlett, S., & Casey, C. (2005), implementation of a perfect performance management system is far a challenging scenario because of certain organizational or geographical limitations. Since an ideal system may requires ample of resources like sufficient funds, readiness of the people, massive training programs for employees, trained appraisers or even a totally unbiased system of performance appraisals, which may not be all time available due to practical restrictions either organizational or country-wide. As in the case of male dominated and collectivist nation of Ghana with socio-cultural supremacy over organizations, which makes it difficult to justify the implementation of right kind of performance management system that could be expected to depict efficiency and effectiveness at an individual as well as organizational level, Kwaku Ohemeng, F. L. (2009). Therefore, to curtail the impact of such challenges on the designing and implementation of a successful performance management system for Well Fit, Health and Fitness Club, subsequent checklist (Herman Anguina, pg 29 and 30) is considered to support the executives to incorporate these features to attain a well aligned and integrated performance management system to meet organizational goals.

3. Performance Management System Design

According to Herman Anguina sec. 1.1. "Performance management is a continuous process of identifying, measuring, and developing the performance of individuals and teams and aligning performance with the strategic goals of the organization". Openstax depicts that Performance Management System is the fundamental bustle of an organization to plan for achieving the best from employees' performance as well as organization's yield, which can be elegantly achieved through mission oriented approach communicated throughout the organization. Performance management is the system through which organizations set work goals, determine performance standards, assign and evaluate work, provide performance feedback, determine training and development needs and distribute rewards (Briscoe & Claus, 2008). A study directed by Development Dimensions International (DDI), a global human resources consulting firm appraising in leadership and selection,

established that interpreting the business strategy into favourable outcomes of financial performance, efficiency, customer satisfaction, employee job satisfaction and product excellence are the notions of performance management system. Moreover, surveys conducted by 79% of CEOs concluded that performance management systems executed in their establishments reflect that efficiency and effectiveness is driven by sound cultural strategies Sumlin, R. (2011).

Herman Anguina argues that performance management is an uninterrupted practice of goal setting and is translated down the hierarchy most efficiently to gain a competitive advantage. Although consistent performance management is determined by human resource management as its utmost priority, for the success of organization it needs to be a joint effort of line managers and human resource managers to realize upward mobility on individual and organizational level and hence attaining corporate goals Openstax. Therefore, the implementation and pursuing of the overall process of performance management needs to be supported by both entities correspondingly.

Halachmi, A. (2005) suggests that "performance appraisal is an important component of performance management, but it is just a part of a bigger whole because performance management is much more than just performance measurement." A study on Germany-based Siemens explains its philosophy of autocratic performance management system to entire organization having measurable goals, tangible implementation and severe penalties Bisoux, T. (2004). Hence the critical nature of performance-oriented approach at Siemens signifies its importance amongst managers and workers.

Although many times performance appraisal brings uncertainty among employees because of problems in appraising, systematic enquiries in this domain suggest that a total halt of the performance management system is not favored in any instance. Hence there is always a need for a fair and justified performance management invented and communicated by Human Resource in order to attain employee satisfaction and organizational development, while reducing redundant coercive and autocratic affirms by management aimed to enhance performance ("Let's Not Kill Performance Evaluations Yet," HBR, Nov 2016, Goler, Gale, Grant).

4. Various Frameworks of Performance Management System

In a case study conducted by (Yadav et al 2013. JBM write down authors?), a number of enterprise performance evaluation frameworks have been scrutinized to understand the relationship between the increasing competition, developments in the industrial revolutions and eventual innovation in the performance evaluation methods with respect to definite structural changes in businesses. Further,

they noticed incredible momentum in industrial revolution, industry 3.0. authenticating maximum managerial effects and consistent modifications in the appraisal systems through input of new dimensions in the popular frameworks/ models of performance management systems to resolve the issues of managing industries and employees for efficiency and effectiveness in the era of technological advancements and inventions presenting challenge to enterprise performance management systems under continual review and recreation of appraisal systems for achieving excellence in businesses despite constant struggle in contextual business environments. For the purpose of convenience, the author? has discussed the development of performance management system in three main periods as 1945-1990 period, 1991-2000 period, 2001-2010 period. Subsequent is the critical analysis of the performance measurement frameworks/ models discussed in the case study.

This section discusses plethora of Performance measurement frameworks/models used in second and third industrial revolutions.

4.1 DuPont System

(Brown, 1914), Taşkan, Karatop, Kubat / Journal of Business and Management, 26 (1), March 2020, 79-119.

With major dimensions of net profit margin, total asset turnover and financial leverage, companies' return on equity is calculated through DuPont System of performance evaluation. Original factors of a corporation's profitability are studied along with changing rates of the company. However, it fails to consider the cost of capital of the enterprise, while capturing only short-term performance.

4.2 Tableau De Bord

Process engineers, 1930s

An intense need to address new methods for improving production processes, the French Tableau De Bord was designed to appreciate cause and effect relationships of production developments. The context of knowledge being financial, social and quality aspects of performance management including customer and process focus of measures. Further, it's comparable to the American Balanced Scorecard with well- adjusted financial and nonfinancial indicators. However, the model mainly focuses on daily operations instead of addressing strategic issues of the firm.

Performance measurement frameworks/models, Industry 3.0.

4.3 Residual Income Model

Marshall, 1890

After the Second World War, Residual Income Model was proposed, which was the advanced version of the ROI criteria developed in response to the limitations of ROE and ROI. Hence eliminating these deficiencies, new dimensions of performance measure such as net operating income, cost of capital and invested capital were introduced in the frame work. However, the model neglects to incorporate the benefits of non- financial measures in the performance management system of enterprises

4.4 Social Accounting

A group which consists of accounting scientists, 1970s

Since social responsibility practiced by larger firms found the need to add new scope to the frame work. Therefore, including fringe benefits, pension and training programs for employees along with pricing policies, quality control, combating pollution, energy conservation measures and health and safety provision for company shareholders as well as outside community. However Lehman (1999) suggested that informative effort could get hindered by some valuable trends in reform accounting framework.

4.5 Strategic Management Accounting

Simmonds, 1981

For the development and implementation of long-term business realization, the model explains the importance of the investigation of the firm's management accounting data as well as the competitor. Therefore, strategy, goals, customers, employees, processes and information became the magnitudes of performance measures in this model. The frame work is based on long term achievements, regular environmental scanning and company's strategic intents, conversely the idea fails to achieve wider acceptance.

4.6 Business Excellence Models

Quality organizations, the end of the 1980s

Based on the principles of total quality management (TQM), enterprise performance standards are the tools for implementation of the business excellence where objectives differ according to organizational main concerns. To each Business Excellence Model, dimensions of the frame work are also distinguished for example, contribution to reward, self-evaluation, business process improvement, appraising criteria and strategic planning are some of the well-known objectives. However, inability of the tools to measure certain performance dimensions is verified because of its broader scope. Contrary to having a neutral and unbiased appraisal system, chances of inaccuracy exist in such self-appraisal performance tool.

4.7 Activity Based Costing

Kaplan and Cooper, 1988

Extended cost allocation method is the root of the Activity-Based Costing (ABC) model, where initially actual activities are assigned indirect costs and then products utility criteria is addressed. Raw material cost, labor cost and general production cost are the extents of performance measurement. Manufacturing cost of parts is prudently evaluated through this model. ABC model has achieved an exceptional level among critiques. Complex production environment has been the main area of performance where it can execute different activities and processes smoothly. However due to the complexity of the tool, various businesses have avoided to use their techniques.

4.8 Sink and Tuttle Model

Sink and Tuttle, 1989

The business performance is explained and declared as multifaceted tool having a strong correlation among seven performance benchmarks. Effectiveness, efficiency, quality, productivity, quality of work life, innovation, and profitability/ budgetability are the dimensions of performance measure. Despite transformations in other areas of concern, performance criteria strongly remain the same for enterprises since the inception of the model. However, flexibility need and customers voice are beyond the scope of the model.

4.9 Maskell Model

Maskell, 1989

The catchphrase, performance measurement for world class manufacturing, guides towards Maskell Model, especially implemented for American companies. Incorporated with dimensions of performance measurement as distribution attainment, customer service, process time, production flexibility, quality, financial measures and social issues. Balanced measurement is provided through the model with synchronicity of financial and nonfinancial performance metrics. However, some stakeholders are excluded from the framework.

4.10 Performance Measurement Matrix

Keegan, Eiler and Jones, 1989

The strength of the model is evident from integration of different performance dimensions while using flexibility in scope. The usage of extensive terms such as internal, external, cost and non-cost is widespread in the model. Moreover, the frame work is adaptable to every performance dimension due to its inherent flexibility. However this

important feature has introduced subjectivity, which can affect the success of appraisal.

4.11 Success Dimensions

Shenhar and Dvir, 1990

The efficacy of the model lies in its multidimensional methodology, where three organizational levels such as project, business unit and company are appraised along with four time preferences of very short, short, long and very long. However, it fails to provide specific functioning trials for each dimension. Further, inability of industry level testing has confined its utility however, experimental tests have been notified at some project levels. Moreover, human resources dimension of the enterprises are also neglected.

4.12 Performance Measurement Questionnaire

Dixon, Nanni and Wollmann, 1990

The intent behind the promotion of this model was to address and recognize the improvement needs of a firm. Hence performance measurement improvement plans were instantly developed to assist managers in resolving the issue. Quality, labor productivity and machine productivity are the scope of this model. A clear mechanism for describing firm's improvement areas along with practicality of the performance measures has been the benefit of the model whereas, the framework neglects the important domains of assimilated measurement system and continuous improvement.

4.13 Customer Value Analysis

Customer Value, Inc., 1990

It is a perfect market-driven performance measurement system discovering all performance measures around market parameters. Value pricing charts, benchmarking analysis, product features score comparison and priorities chart are the measurement tools of this model. However, the major constraint of the frame work is its market-oriented feature.

4.14 Strategic Measurement Analysis and Reporting Technique

Wang laboratories, 1988-1989

Enterprise management control system established with the determination of defining and maintaining perpetual success and introducing related performance indicators is the foremost domain of the model. The scope of the model is market, financial, customer satisfaction, flexibility, productivity, quality, delivery, cycle time and waste. Integration of functioning performance indicators along with the wider goals of company are the reasons for its widespread acceptance. However, the system fails to

identify key performance indicators (KPI) and fails to incorporate the idea of continual improvement.

4.15 Results and Determinants Framework

Fitzgerald et al., 1991

The model features the notion of connectedness of business events. It emphasizes that the results obtained today are driven by past enterprise performances. The unique dimensions of the frame work are competitiveness, financial performance, quality, flexibility, resource utilization and innovation. In addition, lagging indicators are the outcomes while leading indicators are the determinants of the model. However, major drawback of the frame work is non-financial measures, stakeholders and their behavioural aspects associated with performance.

4.16 Measures for Time Based Competition

Azzone et al., 1991

Employment time of the enterprise is a way of competitive advantage for the firm addressed in the model. Research and development, engineering time, operations-throughput time, sales and marketing-order processing lead time are the major areas of the performance measure. Quantitative measures are not long-term ideas for business excellence while productivity and effectiveness are wider dimensions of performance.

4.17 Economic Value Added

Stewart, 1991

Financial measures is the scope of model with cost of capital comprising debt and equity. While resolving the agency issues, the model stretches optimum results. Both shareholder and organizational interests are comparable nevertheless model neglects the future-oriented benefits and confined to the evaluation of enterprise merely by financial goals completion.

4.18 Integrated Performance Measurement

Nanni et al., 1992

The model applies ordinary management accounting with service centered tactics with financial, strategic and operational measures being the domains of performance measurement of the company. In addition, management accounting intellect has been the outcome of influential integration of strategic and operational standpoints to management accounting arena. It lacks product-focused approach and neglects some performance dimensions for measuring enterprise performance.

4.19 EFQM Excellence Model

European Foundation for Quality Management, 1992

The model is based on the notions of total quality management and sustainable excellence. In addition organizations are evaluated for European Quality Award. The scope of the study is leadership, people, strategy, partnerships, resources, processes, products/ services, individuals' results along with customer, society and business outcomes. The model addresses a number of performance areas and continual performance improvement while being comprehensive in nature. The main limitation to its utility is the feature of self-evaluation, biasness and having broad spectrum of categories.

4.20 Balanced Scorecard

Kaplan ve Norton, 1992,

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Harvard business review article, 2007

Balanced Score Card facilitates evaluating firms' performance on financial and nonfinancial measures, hence providing a balanced measurement tool. It enforces business excellence through stimulation and motivation cascading the organizational goal to every level in structure along with provision of real-time feedback and performance linked incentives made possible through vertically and horizontally integrated approach. The major scope of the model is customer, financial measures, internal business processes, innovation and learning. Firm's vision and strategy are reflected in daily individual performance to achieve corporate goals. However, the framework fails to include the viewpoints of human resources, employee satisfaction, supplier performance, product/service quality and environmental/ community aspects, hence limits its usage in certain businesses.

5. Discussion

5.1 E-Business System Flow for E-Booking App

The internet-based e-Booking system is a web-based software application that can run as MobileApp and WebApp, which covers business system intelligently. The user requires fast easy and hurdle-free access to the e-ticketing for which we have redefined the e-booking business system as described in Fig.2 adapted from [16].

The e-Business based e-Booking system follows all the norms of "System" design. It takes responses from three functions as input namely (1) Business Management, (2) Organization Operations, and (3) Technology Infrastructure, to operate business smoothly and efficiently.

The system provides an output as (4) Service as well as ROI (Return on Investment). Feedback to check deficiency is also incorporated as (5) Business Challenge, which respond to the business management with feedback and criticism, which is rectified or improved and become again input to the E-Business System. The detailed function of each component of this system is described below.

Business Management

Business has various functions to run an enterprise smoothly. Here the core function is monitoring the input to process block i.e. e-Booking system. It monitors types and variants of booking, customer queries, services responses, revising criticism to provide improved input as a revision of policy function.

Organization Operations

This block work to redesign the booking system mechanism to improve the regular operation of the system. Further, it develops job functions, and an improved system workflow is modelled. This approach provides the opportunity and eases to expand the business to more service point to reach the customer.

Technology Infrastructure

The main function of this block is to provide and establish smooth technology infrastructure along with the service and maintenance, implementation, and procurement of hardware, provision of attractive downloadable Apps of software, configuring databases for queries, connection to network without any denial of service, and providing interactive web media interfaces with touch screen and assistive technology setup.

E-Business or E-Booking System

This block is a central part of the whole system also known as E-Booking Engine. This is a processing function which takes inputs from business management, organization operations, and technology infrastructure. Performing with zero denial of service to business, advertising the features, and providing sales promotions as push technology.

Service and Return on Investment

The output of the system is a service to the user or customer as well as a nominal return on investment ROI. The aim of the business here is an increase in revenue with continuous profitability.

Feedback as Business Challenges

In order to provide improved service, the feedback plays a vital role which helps to rectify customer or service criticism improved through business management prior to again input to the process function of the e-Booking system. The main challenges are controlling setup costs and facing the competition of other competitors.

6. E-Booking Engine Architecture

The “Internet-based e-Booking Engine” (IBE) is an application that helps the travel, tourism, transportation, hospital, bank and all types of service industries with support of booking service e.g. flight reservation, taxi or bus ticket, ship, stadium match ticket etc. through the internet via mobile phone or computer or from phone call. It helps consumers to obtain such services online without leaving home [6] [12].

This provides a global computerized booking and service reservation via the internet with a single point of access i.e. via mobile phone to book a flight, hotel, car, a product from the superstore, pay utility bills, order food etc. or via service mobile agents online. For example in the case of a hotel, the customer can select the best hotel in a prime location with modern facilities, clean environment and having affordable rates [17]. In comparison to this, it can be much time-consuming or wastage, sometimes costly when doing this by self approaching physically or via physical service agents or broker. The rise of internet or www i.e. world wide web has revolutionized the way of communication between customer to customer, business to business, and business to customer or vice versa. The communication and transit which usually took weeks and months became a possible matter of a couple of seconds globally. This technology has grown drastically with the inventions of smartphones, PDAs, and similar devices known as computers. The wireless technology gave further value to this communication that now business is done on the users’ fingertip. This has made ease to develop WebApps and MobileApps software with various objectives to facilitate human more effectively. With this background in mind, we have proposed a digital tourism agency, the customer is allowed to book travel from any place and at any time with own selection of service with a better choice in the shortest time [18] [19] [20]. Fig.3 shows the Internet-based e-Booking (IBE) Engine Design Architecture.

The e-Booking system workflow model is comprising of phases with the sequence of data acquisition, classification and categorization, descriptive analysis, and reports communication. The collected data usually is unstructured, ranging with wish presentation of business and customer. Keeping in view the objective and subjective analysis of data, the data filters are applied to make it categorized and classified in groups. This became now easy to understand the dynamics of descriptive graphs with the provision to accommodate community or customer wishes. The natural language processing, the content of speech recognition, and advanced artificial intelligence techniques are used at customer help sites. The graphical views of this data provide the results to offer a promotion on sales and services [21] [22] [23] [24].

7. E-Booking WebApps/MobileApp Design

7.1 Design Considerations & Quality Focus

As it is described earlier that Social Web requires connection to the objects via some network technology, where user access interface of the software application is indeed needed. Usually, WebApp or MobileApp software tools are utilized. These tools are designed having the consideration of web science methodology with the concept bearing of Sociology, Computer Science, Economics, and Formulation via Mathematics etc. Since Web Science formulates research from disciplines with diversity; constituting Sociology, Computer Science, Economics, and Mathematics etc. [25]; All such ingredients are followed in design.

The quality of a WebApp/MobileApp should be considered in terms of the metrics of efficiency, reliability, functionality, usability, scalability, maintainability, security, and time-to-release. The characteristics of simplicity, consistency, robustness, visual appeal, identity, and navigability are the key concerns and should be focused on keeping the social concerns in considerations [26] [27].

7.2 Nine Design Consideration Focal Areas

Nine different areas are mainly focused while designing of WebApp or MobileApp of E-Booking App. These are (1) Front-end User Interface, (2) Aesthetics, (3) Content framing, (4) Architectural Flows, (5) Navigation, and (6) Components. Besides these, the technology for (7) Configuring web/mobile setup, (8) Performance tuning, and (9) Security; are also kept in mind. The best and systematic approach to design Web/Mobile App i.e. Object Oriented Hyper Media Design (OOHMD) method is followed. OOHMD recommends a systematic process for designing of an abstract interface, conceptual view, navigational map, and the deployment visuals. Fig.4 describes the design model for WebApps and MobileApps for IBE.

7.3 Design Descriptions

The front-end User Interface (UI) design covers structure with the organization of UI with the inclusion of screen layout, detail of mode of interactions, and some detail of navigation mechanism. The outlook or graphic design i.e. "Aesthetics" best described as "look and feel"; including object colour schemes, shades, contrast, brightness, geometric views, text size and colour, font style, and their placement along with picture images is considered. The content of any WebApp/MobileApp is considered highly sensitive since carelessness creates a lot of confusions. Therefore while designing Contents; it's framing layout, structure, the outline of content objects, their link associations and relationships with the primitive of browsing for the basis of navigation, are considered. While designing

web architecture a hypermedia structure is designed in either or mixed forms of linear, hierarchical, network, and grid structures. The web infrastructure is then associated with content layout structure with proper configuration keeping in mind the ease of navigability to achieve the purpose of that Web/MobileApp. All such principles are incorporated. The navigation design focus is set on navigation and surfing flow between every content objects to achieve the main function of that Web/MobileApp. The navigation semantic units are developed having characteristic information of that object with defining multiple ways of navigation, with links and nodes associated. A navigation syntax is also developed to follow the web mechanism as part of semantics. The detailed design of logic processing is considered an integral part of the component to be designed so that component becomes configurable as per fitness, and fully functional [6] [28].

8. Business Intelligence and Data Analytics

Business intelligence (BI) sometimes interchangeably called business or data analytics to provide data scientists with the predictive model and inference obtained through data mining techniques for taking key business decisions [9]. Understanding the importance and potential of data analytics, many brands and organizations have begun to invest a lot of resources in them. However, most of these data analytics are limited to information boards and reports, while the field of data analytics and data science is large and it has many potential opportunities [11].

8.1 Big Data Challenges and Issues

As compared to a simple large database, big data is considerably multiple times larger i.e. gigantic in size and volume distributed database, which is a challenge to handle with considerable issues over utilization. New methods and technological solutions to Database management system (DBMS) software for processing query and access as well as network infrastructure are required. It is very difficult to handle such a mechanism to generate the query, to process the query, to extract the concerned results, and to analyse the results for further presentation. The existing traditional query system doesn't function. Some new data mining algorithms are needed. Despite these are the issues and challenges, big data is much useful to provide optimum accurate results for decision making benefitting the business ventures [35] [36].

8.2 Storage and Processing Issues

Putting efforts to capture whole and more consolidated information; the best and accurate decision to market and generating revenue is expected from data scientists. The infrastructure setup becomes a challenge and costly, where usually cloud-based services provide the option. The main issue is uploading and downloading of Terabytes and

Exabyte of data on day to day basis on a cloud server, which takes large processing time. However, the data extracted by analytical tools and again uploading and synchronizing the update is also a challenge as the data has a dynamic nature i.e. changes and variations are so rapid in comparison of upload and download time. On the other side, the wireless infrastructure of a cloud is distributed geographically becoming problematic to cover all locations to judge the nominal source of data. Therefore the capacity and performance issues are compromised where cloud storage also leads to data security problems. Thus many security models are world-wide proposed [11] [34] [36] [37].

8.3 Analytical Challenges

Big data brings blessings as well as a disguise. It is a capture of every information about an entity or process or event but along with it bear some huge analytical challenges. Main challenges are reforming the unstructured data and aligning the semi-structured data. However, the collected structured data require extensive parallel processing synchronous analytical algorithms co-incident with a time base, to provide quality data with the consistency of information. The Exabyte of data is very difficult to handle. The credibility of analytical process execution is also worth to determine the usability of results in decision making. If the processed data is not used or never used for any decision making, the huge amount spends on developing an algorithm, the time to process and produce results, and the infrastructure used will go wasted. So it is quite advisable to use any one techniques among two i.e. either (1) incorporate the massive volume of data to process and produce analytics, or (2) Credibility of decision should be analysed prior to process the big data since it costs high [36].

9. Conclusion

With the advent of the electronic social web and the global reach of the customer to market or enterprise business has changed the world in a couple of decades. Evolution of data science, machine learning, artificial intelligence, and other scientific fields have supported the business to go electronically with improved business strategies, and well design of application architecture. The need for a customer to access the market could be fulfilled only with the solution of e-commerce web.

This research concludes that:

- The business framework is required to be redefined to incorporate technology compatible with business policies and as per the comfort of customers with the focus on high return on interest with the provision of quality of service.
- There is a need for software-based electronic WebApp or MobileApp to operate as an electronic booking agent with the framework of global compatibility which should be accessible from anywhere on earth.
- The latest scientific methods are required to be incorporated to enhance the software tool. Such methods belong to the evolving discipline of web science, data science, big data, artificial intelligence, and machine learning.
- Rich data processing machine as well as the expertise to handle huge databases is rare and required.

Further, a new framework for electronic booking system is introduced in this research. The framework is based on wish engine with data mining method and process of booking for finding the optimized results of analyses for the optimal decision which helps to improve advertising and promotions of the product and add new services.

References

- [1] T. Berners-Lee, W. Hall, J. Hendler, N. Shadbolt and D. J. Weitzner, "Creating a Science of the Web," *Science*, vol. 313, no. 5788, pp. 769-771, 11 August 2006.
- [2] H. Saleem, Interviewee, *Software Has Become A Driving Force*. [Interview]. 2004.
- [3] D. Burdick, "Celestica Transforms Competitiveness With C-Commerce," Gartner, Inc., 2000.
- [4] C. Debabroto, G. Rajdeep and V. Sambamurthy, "Shaping up for E-Commerce: Institutional Enablers of the Organizational Assimilation of Web Technologies," *MIS Quarterly*, vol. 26, no. 2, pp. 65-89, 2002.
- [5] T. L. Friedman, *The World is Flat: A Brief History of the Twenty-First Century*, Macmillan, 2005.
- [6] H. Saleem, "Mobile Agents: An Intelligent Multi-Agent System for Mobile Phones," *International Organization for Scientific Research - Journal of Computer Engineering (IOSR-JCE)*, vol. 6, no. 2, pp. 26-34, 2012.
- [7] H. Saleem, K. B. Muhammad, A. H. Nizamani, S. Saleem and A. M. Aslam, "Data Science and Machine Learning Approach to Improve E-Commerce Sales Performance on Social Web," *International Journal of Computer Science and Network Security (IJCSNS)*, vol. 19, 2019.
- [8] J. Hendler, N. Shadbolt, W. Hall, T. Berners-Lee and D. J. Weitzner, "Web Science: An Interdisciplinary Approach to understanding the Web," *Communications of the ACM*, vol. 51, no. 7, pp. 60-69, 2008.
- [9] C. Stedman and E. Burns, "Business Intelligence (BI): How to choose manufacturing software for business intelligence," TechTarget, 2019. [Online]. Available: <https://searchbusinessanalytics.techtarget.com/definition/business-intelligence-BI>. [Accessed 2019].
- [10] S. M. A. Burney and H. Saleem, "Inductive and Deductive Research Approach," University of Karachi, Karachi, 2008.
- [11] M. A. Wani and S. Jabin, "Big Data: Issues, Challenges, and Techniques in Business Intelligence," *Big Data Analytics*, pp. 613-628, 2018.
- [12] O. E. Maamra and M.-K. Kholadi, "Intelligent Reservation Systems Based on MAS & Data Mining Method," in *International Conference on Advanced Intelligent Systems for Sustainable Development*, Cham, 2018.

- [13] S. K. V and R. P, "Data Mining and Warehousing," *Journal of Computer Applications*, vol. 5, no. 1, pp. 35-43, 2012.
- [14] H. Saleem, M. K. S. Uddin and S. Habib-ur-Rehman, "Strategic Data Driven Approach to Improve Conversion Rates and Sales Performance of E-Commerce Websites," *International Journal of Scientific & Engineering Research (IJSER)*, 2019.
- [15] H. Boinepelli, "Applications of Big Data," in *Big Data. Studies in Big Data*, vol. 11, New Delhi, SpringerLink, 2015, pp. 161-179.
- [16] K. C. Laudon and J. P. Laudon, *Managing Information Systems: Managing Digital Firm*, New York: Pearson Inc., 2018.
- [17] S. A. O. Ogirima, T. R. Awode and O. O. Adeosun, "Online Computerized Hotel Management System," *Journal of Computation in BioSciences and Engineering*, vol. 1, no. 2, pp. 1-6, 2014.
- [18] C. McTavish and S. Sankaranarayanan, "Intelligent Agent based Hotel Search & Booking System," in *2010 IEEE International Conference on Electro/Information Technology*, 2010.
- [19] S. S. Bhagat, A. D. Bagul, P. N. Patil and S. A. Dahale, "Perceptive Car Parking Booking System with IOT Technology," *International Research Journal of Engineering and Technology (IRJET)*, vol. 5, no. 2, pp. 1123-1125, 2018.
- [20] H. Saleem, "Review of Various Aspects of Radio Frequency Identification (RFID) Technology," *International Organization for Scientific Research - IOSR Journal of Computer Engineering (IOSR-JCE)*, vol. 8, no. 1, pp. 1-6, 2012.
- [21] H. Saleem and F. A. Zaidi, "Identification and Realization of Trace Relationships within Requirements," in *International Conference on Software Engineering (ICSE'06)*, Lahore, Pakistan, 2006.
- [22] H. Saleem, "Towards Identification and Recognition of Trace Associations in Software Requirements Traceability," *International Journal of Computer Science Issues (IJCSI)*, vol. 9, no. 5(2), pp. 257-263, 2012.
- [23] S. M. A. Burney, H. Saleem, N. Mehmood and T. A. Jilani, "Traceability Management Framework for Patient Data in Healthcare Environment," in *3rd IEEE International Conference on Computer Science and Information Technology (ICCSIT)*, Chengdu, China, 2010.
- [24] H. Saleem and S. M. A. Burney, "Imposing Software Traceability and Configuration Management for Change Tolerance in Software Production," *IJCSNS - International Journal of Computer Science and Network Security (ISSN:1738-7906)*, vol. 19, no. 1, pp. 145-154, 2019.
- [25] S. Han, "Why Do We Need Web Science Research?," Department of Information Technology Research (DITR), 2009. [Online]. Available: <https://www.slideshare.net/webcikorea/why-do-we-need-web-science-research>. [Accessed 2017].
- [26] A. M. Rana and H. Saleem, "Novel Integrated Sensor Based Sleep Apnea Monitoring and Tracking System Using Soft Computing and Persuasive Technology for Healthcare Support," *International Journal of Systems Signal Control and Engineering Application (ISSN-p: 1997-5422)*, pp. 43-48, 2014.
- [27] A. M. Rana and H. Saleem, "Novel Integrated Sensor based Sleep Apnea Monitoring and Tracking System using Soft Computing and Persuasive Technology for Healthcare Support," in *9th International Conference on Innovative Trends in Management, Information, Technologies, Computing and Engineering (ITMITCE - 2014)*, Istanbul, Turkey, 2014.
- [28] R. S. Pressman, *Software Engineering: A Practitioner's Approach*, 7/e, New York: The McGraw-Hill Companies, Inc., 2010.
- [29] S. A. Raza, H. Saleem and S. Habib-ur-Rehman, "MCMC Simulation of GARCH Model to Forecast Network Traffic Load," *International Journal of Computer Science Issues (IJCSI)*, vol. 9, no. 3(2), pp. 277-284, 2012.
- [30] H. Mark, W. Ian and F. Eibe, *Data Mining: Practical Machine Learning Tools and Techniques*, Morgan Kaufmann Publishers, 2011.
- [31] M. J. Berry and G. S. Linoff, *Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management*, John Wiley & Sons, 2004.
- [32] D. A. Zighed and R. Rakotomalala, "Extraction of knowledge from data (ECD)," vol. 744, *Engineering Techniques*, H 3, 2002.
- [33] A. Burney, N. Mahmood, T. Jilani and H. Saleem, "Conceptual Fuzzy Temporal Relational Model (FTRM) for Patient Data," *WSEAS Transactions on Information Science and Applications (Journal)*, vol. 7, no. 5, pp. 725-734, 2010.
- [34] J. P. Verma, S. Agrawal, B. Patel and A. Patel, "Big Data Analytics: Challenges and Applications for Text, Audio, Video, and Social Media Data," *International Journal on Soft Computing, Artificial Intelligence and Applications (IJSCAI)*, vol. 5, no. 1, pp. 41-52, 2016.
- [35] V. P. T, "Big Data New Challenges, Tools and Techniques," *International Journal of Engineering Research and Modern Education (IJERME)*, vol. 1, no. 1, p. 6, 2016.
- [36] A. Katal, M. Wazid and R. H. Goudar, "Big Data: Issues, Challenges, Tools and Good Practices," in *Sixth International Conference on Contemporary Computing (IC3)*, 2013.
- [37] M. S. A. Khan and H. Saleem, "Proposed Secure Protocol for Online Health System in Cellular Communication," *Karachi University Journal of Science*, vol. 36, pp. 23-26, 2008.