

INDUSTRY 4.0 AND INDUSTRIAL INFORMATION SERVICES IN INDIA: A PROPOSAL

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Abstract:

Industry 4.0, the fourth industrial revolution has arrived globally. The present study describes that Industry 4.0 not only affects to industry in general and nation as whole but also all the sectors of our lives viz. personal, organisational, physical, social and psychological aspects. The main objective of the study is to describe the role of suitable subject wise industrial information service/systems in the development, support and implementation of the latest industrial revolution i.e. Industry 4.0. and also to present opportunities and challenges due to it and accuracy of data/information to achieve the industrial goal i.e. accuracy, early detection of mistakes, higher, qualitative, cheaper and faster production using modern internet, ICT, robotics, AI, cloud computing, big data, etc. The article deals with how information/data is power and needs in every walk of our life so as to growing needs and implementation of Industry 4.0 especially large multinational industries, where industrial information services play a vital role to support Industry 4.0 by providing pinpointed, proper information to proper users (consumers) at proper time i.e. any time (24x7) irrespective of form, format, language, and geographical location (anywhere) to obtain competitive advantages effective and efficiently. Due to revolutions in information services and Information Communication Technologies (ICTs) has availed 'machine-to-business' connectivity giving rise to machine-as-a-services. Service Life Cycle management and customer satisfaction are two components of it, both of which need support of ICT based information services to industry. Pre-built information centres and libraries (ICLs) and data flow enhancement support of such information services to achieve its outcomes. Real-time data and its analysis are not enough for smart enterprises with techniques of industry 4.0. Increasing digitalisation of data needs instantaneous sharing of information using library 4.0 technologies. Such ICLs need for resource sharing to avail subscription-based information available on Internet. Collaboration and networking of ICLs at world level is well known and need of such ICLs at present day is need of the time to serve industries and information society. The present paper tries to suggest ways to industrial ICLs have to keep pace with such needs to implement Industry 4.0. However, it is limited to Industry 4.0 and industrial information services/systems to implement it. A descriptive method has been used for the study and detailed literature search has been carried out on the needs of industry 4.0 and probable uses of industrial ICL services/systems based on interactive web technologies and cloud-based data and services. Key components of library 4.0 services have also been arrived to support the Industry 4.0 with help of data/information, literature available and trends of developments of web 4.0 technologies and higher. Each industry should have a strong industrial information system to implement Industry 4.0. It concludes that industrial information services are the need of the time to have Industry 4.0.

Keywords: Industry-4.0, Library 4.0, Information Communication Technology (ICT), IT Industry, Clouds Computing, Big Data, Artificial Intelligence, Industrial Information System/Services, etc.

Introduction

The industry 4.0, the term first used by the German Government for a hi-tech project, is used for expected upcoming fourth industrial revolutions due to automation and data exchange in productions after three previous industrial revolutions. These three previous revolutions i.e. first, second and third were due to applications of steam engines, electricity and computers respectively (Srivastava, 2015). Revolutions in the information services and information

communication technologies (ICTs) have moved the cyberspaces towards being intelligent to capacitate 'machine-to-business' connectivity giving rise to 'machine-as-a-services' (Grenachar, 2018) by continuous connectivity of people, machines, data and technology. It is based on information and communication technologies, cyber physical systems, networked communications, big data and cloud computing, real-time computing, etc. (Kusmin, 2016). It provides mass customization, flexible production,

increased production speed, higher product quality and less error during productions, data-driven decision making, better customer satisfaction, new value creation, etc. (Kusmin, 2016). Hence Industry 4.0 not only affects to industry in general and nation as a whole, but also all the sectors of our lives viz. personal, organisational, physical, social and psychological aspects.

Role of Information Services by Information Centres & Libraries

Information is pre-requisite to people and organizations for functioning of routine works as well as development of innovative and modern set up in an industry. Information resources in form of textbooks, reference books, journals, data sheets, standards, consumer studies, designs, maps etc. in electronic and print are essential to the industry people. Library and information centres always subscribe to information resources and participate in various types of networks and consortia for easy and economical access to information at right time to right individuals. ICL services needs up-dating regularly due to large scale changes in information communication technologies.

Objectives of the Study

Voluminous data availability on clouds in open and subscription-based access where Internet is not the only source of data and information, but also a link of people, things and services (Schlaepfer and Koch, 2014), presents new challenges to avail genuine information expeditiously and exhaustively to the information users to achieve the industrial goal i.e. accuracy, early detection of mistakes, higher, qualitative, cheaper and faster production using modern internet, ICT, robotics, AI, cloud computing, big data, etc. The present study is intended to study new roles and methodologies suggested for the information and library professionals to cater to such

new information needs of industry professionals.

Need of the Study

The article deals with how information/data is power and needs in every walk of our life so as to growing needs and implementation of Industry 4.0 especially large multinational industries, where industrial information services play a vital role to support Industry 4.0 by providing pinpointed, proper information to proper users (consumers) at proper time i.e. any time (24x7) irrespective for form, format, language, and geographical location (anywhere) to obtain competitive advantages effectively and efficiently. Due to revolutions in information services and Information Communication Technologies (ICTs) has availed 'machine-to-business' connectivity giving rise to machine-as-a-services. Service Life Cycle management and customer satisfaction are two components of it, both of which need support of ICT based information services to industry. Pre-built information centres and libraries (ICLs) and data flow enhancement support of such information services to achieve its outcomes. Real-time data and its analysis is not enough for smart enterprises with techniques of industry 4.0. Increasing digitalisation of data needs instantaneous sharing of information using library 4.0 technologies. Such ICLs need for resource sharing to avail subscription-based information available at Internet. Collaboration and networking of ICLs at world level is well known and need

of such ICLs at present day is need of the time to serve industries and information society. The present paper tries to suggest ways to industrial ICLs have to keep pace with such needs to implement Industry 4.0.

Scope and Limitations

The study is limited to Industry 4.0 and industrial information services/systems to implement it by information centres and libraries.

Research Methodology

A descriptive method has been used for the study and detailed literature search has been carried out on the needs of industry 4.0 and probable uses of industrial ICL services/systems based on interactive web technologies and cloud-based data and services.

Information Services Required to Industry 4.0

The Industry of today is moving towards Industry 4.0 where data, information, people, things and technology are interconnected by the Internet. The Internet itself is in a growing stage in terms of number of data available on clouds and the interaction of data and people. The history started from 'web of documents' in web 1.0, which has reached into semantic web in web 3.0 via social web in web 2.0 (Aghaie et al., 2012). Table 1 clarifies some of the differences that are referred generally. Web 4.0 is also imagined as next to web 3.0 expected to be based on intelligent systems (Aghaie et al., 2012; Sharma, 2012).

Table 1: Comparison of Web 1.0, Web 2.0 and Web 3.0

Web 1.0	Web 2.0	Web 3.0
1996-2004	2004-2016	2016+
The Hypertext Web	The Social Web	The Semantic Web
Tim Berbers Lee	Tim O'Reilly, Dale Dougherty	Tim Berners Lee
Read Only	Read and Write	Web Executable Web
Millions of users	Billions of Users	Trillions of Users
Echo System	Participation and Interaction	Under- standing Self
Directional	Bi-Directional	Multi-User Virtual Environment
Companies publish contents	People publish contents	People build application through which people interact and publish content
Static content	Dynamic content	Web 3.0 is curiously undefined. AI and 3D,The web learning
Personal Websites	Blog and Social Profile	SemiBlog, Haystack
Message Board	Community Portals	Semantic Forums
Buddy List, Address Book	Online Social Networks	Semantic Social Information

Based on developments in the World Wide Web, Library 1.0 to Library 4.0 is also defined and imagined, as libraries of modern electronic age is based on availability of information on World Wide Web. Industry 4.0 is imagined which needs Web 3.0 and above, hence Library 3.0 and above. Some modified sources of information and related services are listed that are probable in near future.

Intelligent Library

Due to not only user specific needs of information for Industry 4.0 but availability of information as web 4.0 in future, intelligent libraries will be a reality in future information services. A number of researchers have agreed with the fact that such library systems will be able to analyze user needs and information embedded in the documents (Aghaie et al., 2012; Sharma, 2012; Chauhan, 2009). Software is in process to solve the problems of proper indexing, query processing, evaluation of query results to maintain precision in the information retrieved (Shah & Finin, 2018). Semantics based digital library software with faceted search; enhanced access possibilities and a proof-of-concept implementation are proposed to bridge the gaps between social webs and online libraries (Garcia-Crespo, 2011).

Library Collaborations and Relations with Publishers

Big data and clouds are the reality of the future web. Retrieval of information through library collaborations for online subscriptions and information sharing will be determined by better availability of tools on big data online. Manyika et al. (2011) put their worry that the size of data will be beyond the capabilities of devices and storage, collection, management and analysis of data can prove hard. Contrary to this, Lehong & Laney (2013) states big data as cost saving. Lee (2013) sees advantages to the libraries after expansion of the big data. Role of publishers and its relationships with libraries will prove more transparent where the role of libraries will be only in channel of information, at the place of real stacking of information (Natarajan, 2009).

User-Friendly Context-Aware Services

Information is enormously available on web and clouds, expansion of which needs filtering information as per user needs. Context aware services in libraries serve with specifications of its users regarding their location, time, device being used by them, data inputted and user behaviour etc. (Noh,

2013). Cognitive searches based on the users attitude and information behaviour may include user-librarian conversation matching with the authors' work, and cognitive work analysis in terms of search strategies followed by the users (Pejtersen, 2017). Books status information and my library management service and context aware technology may be very helpful to the library users (Lee, 2013; Noh, 2013). Results of such researches may be more fruitful to the information users of industry 4.0 people, and libraries can be in a better position to avail resources online as per user attitude, information behaviour and demand.

Knowledge Networks

Knowledge networks are prominent tools for developing knowledge society in a country and in world. Library services should be available individuals on such networks with some rules of payment systems for documents retrieved. Online unified catalogs of library may support such services.

Other Aspects of Information Services to Industry 4.0

Information services may have based on maximum online clouds resources and use of print for information search may be minimised, in age of

industry 4.0. Modifications in quick printing devices, augmented reality, virtual reality, open source platforms, semantic web technologies, products like Google Glass, Markerspace, etc. enhance interactive communications and services among information users of ICLs in near future. Librarians and information professionals have a duty to avail right information to its users from enormously available information on the web.

Conclusion

Information retrieval, sharing and access are being modified due to applications of Web 3.0 and Web 3.0+ technologies. Online information with interactive web and technologies have to play a prominent play to avail right information to the right individuals properly at the time when manufacturing processes will be integrated globally.

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