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Industrial revolution 4.0: implication to libraries and librarians

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Introduction

"The term Industry 4.0 stands for the fourth industrial revolution defined as a new level of organization and control over the entire value chain of products. It is aimed at the increasingly requirements of individual customers. (Vaidya *et al.*, 2018). The Fourth Industrial revolution is changing how we live, work and communicate. Some best examples are self-driving cars, online shopping, drone delivery services etc. Students today need to stay relevant for future job markets, as artificial intelligence has produced and changed many jobs. The Fourth industrial revolution is mostly focused on artificial intelligence. IR 4.0 empowers us how we value the things we use now and into the future. The changing in business models and employment trends are new shapes of IR 4.0. Artificial intelligence and automation process are changing agents in Fourth industrial revolution which will make certain employees redundant and will replace them with new workers with the needed skills or with machines that do the job cheaper. World economic forums claim that 65per cent of kids enrolling in primary education today will end up working in jobs that haven't been created yet. In the old days' students were going to universities and colleges to study for a degree that will set them up for a job for life, but, the fourth industrial revolution has made things easier. Libraries and librarians are highly been affected by this 4IR in term of services and marketing values. Libraries are changing agents of 4IR and if not updated itself will face numerous problems. Librarians around the globe are frightening that Fourth Industrial revolutions will badly affect their jobs and unemployment will be increasing in alarming rates. But, 4IR is merely a friendly revolution and will pave the way for libraries and librarians if adopted as a tool for services.

Phases of industrial revolution

First industrial revolutions

Great Britain is the pioneer of the first Industrial revolution where hand production methods started from 1720 to 1840. A number of items were produced in this age. Great Britain paved the way for entrepreneurial, legal and cultural foundations were set up and the free market economy was introduced which later led them to the first Industrial revolutions. Number of research universities was established in this revolution Penprase (2018). In the first industrial revolutions, libraries had increased in size but because of the haphazard growth, libraries administration had become weak and

funds for the acquisition tended to be inadequate. As a result the services were almost nonexistent. The positions of the librarians were considered as a part-time job and cataloging lacked proper methods Francis (2017) Figure 1.

The second Industrial Revolution beginning: from 1850 to 1914

The second Industrial revolution can be traced back early in 1850-1914. Under this revolution, the Public libraries act of 1850 was allowed by the borough in England and Wales to established Public libraries in this revolution. In 1887 few libraries were built until queen Victoria golden jubilee period. While dozens of small, medium-sized libraries were established in 1880 and 90 s. However in the age of 1914. Sixty-two per cent of people living in the library authority area. The book-stock were increased and opened up to the readers under the second industrial revolution.

Third Industrial Revolution

The 20th Century witnessed the third industrial revolution. Under this period new technologies such as the internet and the renewable energies changed history. The computer became faster and better able to store huge data. The Libraries data storage problem was solved in this revolution. Machine Readable Cataloging took place in 1966 and got more advancement in this revolution. On combining Machine Readable cataloging with the Library of Congress in 1966. The library system advanced from a localized offline batching era of automation into an era of online via OCLC in computer networking. Computer, catalog records were brought into networking with new standardization. To overseeing the

library automation planning, selection and implementation Libraries began to establish offices directly. Due to the technological complexity of the automation process, the sophistication was considered as tools for experiments. Automation became easier to work with for the professional and users. Inter-Library loan and online database searching also started in this revolution. Libraries became more decentralized due to automation factors. Resource sharing was adopted due to the continued lack of funding and space for material. Reference services became a serious topic more sophisticated because of highly specialized information. Inter-Library loan became more cross -accessible via accessing services at national and international level to fulfill the needs of the society. The Library of 1990 became more vibrant by combining together the centralized and decentralized databases such as Ohio Link a proposed network of seventeen of Ohio's academic libraries sharing Featherstone (1990).

Fourth Industrial Revolution

We have stepped down in the 4th Industrial revolutions which are guiding us on how to live and work in this revolution. As this revolution mostly depends on data and internet both which tell us how to gather the data in the ever-growing amount of information. As this world is fueled by data and internet-connected devices that are capable of collection and processing the huge amount of data. Social Media, smart phones, digital cameras, sensors are creating more information than ever before. The flow of information is increasing in alarming rate. The Fourth Industrial revolution is affecting us whether we know it or not. People and

Machines are connecting to each other at enormous speed. Data is being collected and harnessed like never before. Artificial intelligence, Mobile computing, Machine learning and automation of every trade has become a need of the day. Many people believe that these changes are scarce. In Libraries, we find similar process and less complex, e.g. some academics libraries use robots in combination with RFID technology. The data of bibliographic record can be retrieved from the storage and the books can be shared with users who request for them. This type of application is newer for libraries and considered to be the cutting-edge technology in library industry. Such kind of newest technology is considered to be the part of new industrial revolutions. It seems that such kind of technology may be included in library field via industry 4.0 technology to execute routine work of the libraries for its patrons. Such kind of applications can be made available in the library services for the patrons to use them in proper manner. Artificial intelligence can help the library professionals to detect critical errors while presenting this data on web. AI and internet of things are great examples for library data in 4IR. If such changes were brought into the library services in near future library services will gain more momentum. This is one aspect of IR 4.0. If entire services were shifted on these robust technology the libraries and librarians will make more contributions for the present and prospective members. As we came across to the end of third industrial revolutions and stepped down in Fourth Industrial Revolutions. The library practitioners should use the new lenses about their library data that what is happening and could happen in near future .We observed the third industrial revolutions regarding library technology that large number of data were retrieved in the form of MARC and digital resources. We felt the limitation of technology and vision of purpose for such kind of data being siloed within the context of libraries. The primary purpose of third Industrial revolutions was to create data in the form of Silos for cataloging purposes. Most librarians would still argue that

Figure 1. *Flat, 3D-printed panels to secure outlet inserts in existing holes in study tables*
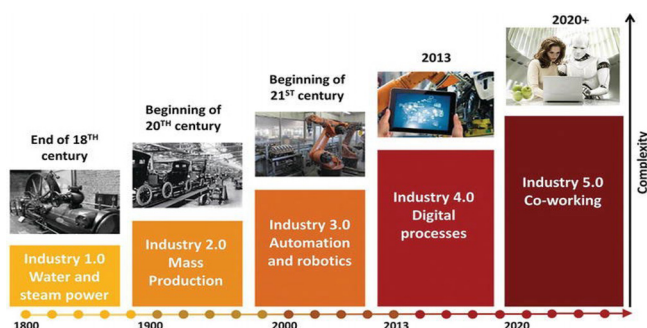
this is the primary and ultimate purpose of library data. Ellen Frederick (2016).

Impact of IR 4.0 on higher education

The Industrial Revolution 4.0 is an outcome of artificial intelligence and many trades and industries have been affected similarly, higher education is also influenced by this kind of revolution to better the standard of human beings in their education and to transform society for better jobs. From task-based characteristics to human-centered characteristic Industrial 4.0 is bringing positive changes in the higher education setup. As the Industrial Revolution is based on both man and machine so, it will reduce the distance between science and technology. Under this IR 4.0 much more interdisciplinary teaching, research and innovation will be a key factor in adaptation. HE 4.0 has become the mission of every university to combine man and machine for positive feedback" Xing and Marwala (2017).

Impact on libraries and librarians

As the tail end of the Third industrial evolution, we are stepping in Industrial Revolution 4.0 technology. We should be aware that what is happening and could be happening to the Data being stored in databases in this age of revolution. We noticed in the third industrial revolution that a huge number of data were stored in a bibliographical and digital format to give access to the patrons and general users in the library. The visions and purpose, and the limitations of technology have become a big problem in the age of IR 4.0. We can imagine the technology and purpose for that data of 50 or so years. Most of the librarians will argue that the data being used in metadata for cataloging the library resources was just used for locating the material in a specific library" Donna Ellen Frederick (2016). To envision bibliographic and authority data having any other purpose until now was a very hard job for all of us. Many cataloging and metadata librarians are wondering how their local MARC Data had been tweaked or modified for other purposes. We are aware that the Library data moves out of its silos and spreading all over the world and we also see the entrance of libraries into the internet of things. The MARC and OCLC's data have been merged with a variety of library software. The MARC data are converted to linked data and finally too big data which create a treasure trove. As in previous revolutions, the librarians were living in interesting times but Industrial 4.0 revolution will be more interesting for the library community Ellen Frederick (2016). The 4IR is stepped down and almost affected many trades and libraries are also one of them. The librarians and libraries should embraced this revolution for number of reasons such as Uber, Book to desk B2D, Mobile work lists alerts and push information for academics etc. As all stakeholders of global polity from the public and private sectors have been affected by this revolutions, similarly libraries should also implement such changes in their services to fulfill the growing demands of their patrons". Cronje (2018).

The fourth Industrial revolutions is already stepped down. The Libraries and Librarians are strive to engage itself in 5.0 revolutions which is a return to humanity. It is a two way shift from knowing your collection to knowing your connection. The new revolution is changing the role of Librarians from knowledge of collection to the knowledge of the users. As alarming rate of volumes in libraries may create problems for librarians to connect these volumes with their patrons in a better way. We can overcome this revolution by continuing professional development with aiming to be thought leaders in the 4th Industrial Age.

Survival in fourth industrial revolutions

Libraries across the globe meticulously created and maintained as treasure trove of data in current transition period in third revolutions. They now uses new lenses for new opportunities and possibilities in the fourth industrial revolutions. Although the MARC record since 2013 will prove as a partner for new revolutions. Using MARC record of last few transition year can drive our car till 2033. We do not know that what will happens to libraries and librarians in 4IR. But, as in third revolutions Libraries and librarians enjoyed the best time will hopefully enjoy this new revolutions as well. Some useful tips if implemented by the library practitioners in their libraries will definitely pave the way for Industrial Revolutions 4.0 are mentioned below:

Mind-set shift of librarians

Many people believe that the changes being brought by Industrial revolutions 4.0 are scarce and need to be more courageous but I believe that stepping down in the industrial revolution will make the work of librarians more better and stronger. It will not only enhance the living standard of librarians but also enhance the safety and security of increased human capacity. People need to change their mindset. As we know that the work looks very different from the past but still people having capacity in entrepreneurial spirit may accept these changes. Technology which we have in present and the technology yet to come will make our duty easier and more durable.

Connecting librarians with machines

Even the greatest grand-masters have been beaten by the computer technology as we heard these sort of story earlier. But, both human and machines have their own strength and weaknesses as both are playing a pivotal role. The computer works are to store data and remaining unbiased in decision making. Similarly, humans are sometimes stubborn in decision making and knows its weaknesses and strength while performing any job or taking a strategic decision. The world always desired more for human skills and human brilliance rather than software and technology on priority. So, both humans and machines are interconnecting people to get more output. Even in artificial chess-playing both machines and humans are the result of teamwork.

Power of data, power of people

Under the revolutions of 4.0 workers will become more powerful and will make smarter decisions. The workers will solve tougher problems and do their job better. The power of data and people have been combined together in this revolution. Here we will quote an example of railroad locomotive powered by massive. The huge amount being spent on highly complex electrical engines when failed many peoples were suffered such as travelers or cargo customers and people whose were involved by maintaining

them on right track again, these can take hours to bring them back after long maintenance. But, under 4IR all diagnosed have already been run and the software will forecast the predictive analytic in advance through 250 sensors on each locomotive which tells that when, why and how the machine is likely to breakdown using predictive analytic. Now the subject-matter experts direct them to repair the locomotive problems in advance.

Mechanic vs technology

To solve some of the world's biggest problem we need skills and talent. But, the most important thing is acquiring mechanics and technology to overcome any difficult task. When mechanics and technology work together, the work gets done faster with fewer errors and better result. Technology did not replace the mechanics; it empowered them to do their job in a good manner. The mechanic can fix their command by using their skills and experience, then that command becomes data that feeds back into the software. Similarly, the Mechanic and technology will jointly produce a better result than that of a manual system in the era of 4IR. The impact of the Fourth Industrial Revolution will run much broader, and deeper, than the first. early to breakdown using predictive analytics. Now the subject-matter experts direct them to repair the locomotive problems in advance.

Impact on small medium enterprises

The Industrial Revolution of 4.0 affected many small-medium enterprises by creating more tension for the masses who are working in a different field. According to the US Bureau of Labor Statistics, these are some jobs that have a 95 per cent or higher probability of being automated Library services are one among them. A 2013 research by Oxford University showed that out of around 700 occupations, were found to have a 99 per cent chance of being automated in the future The Library technicians are also included in 700 occupations.

Conclusions

Industry 4.0 is a term for the so-called Fourth Industrial revolutions. Connecting Cyber-Physical System with technology integration has made the work easier in all trades. Oxford University suggests that 35 per cent of all the jobs in the UK could be at risk of automation in the next 20 years. The smarter ways of working and artificial intelligence are going toward this direction. This is the duty of every worker in every industry to consider the implications of this new transformation to learn how to handle the job in near future. In this revolution, people will get more pace by producing more result with the help of a machine. Many people in library field argue that the industrial revolution will create unemployment in librarianship. But, equipping ourselves with latest technology and artificial intelligent, one can get their job more easily than that of a past. The librarians can reshape their job by trying more skills to develop their job. Under this learning process, one can secure their job future for a lasting period. Libraries and Librarians should also abreast itself with the latest technologies to provide optimal services in minimum time in data tsunami to survive.

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