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DIGITALIZATION IN INDIA: OPPORTUNITIES AND CHALLENGES

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ABSTRACT

This paper highlights the importance, challenges and advantages of digitalization in India. Digitization is the representation of an object, image, sound, document or signal by generating a series of numbers that describe a discrete set of its points or samples. The digital economy is the new productivity platform that some experts regard as the third industrial revolution. India is an initiative of the Central Government of India "designed to transform India into a global digitized hub" by reviving a rundown digital sector of India with the help of improving digital connectivity and skill enhancement and various other incentives to make the country digitally empowered in the field of technology.

The 2016 Union budget of India announced 11 technology initiatives including the use data analytics to nab tax evaders, creating a substantial opportunity for IT companies to build out the systems that will be required. The initiative also lacks many crucial components including lack of legal framework, absence of privacy and data protection laws, civil liberties abuse possibilities, lack of parliamentary oversight for e-surveillance in India, lack of intelligence related reforms in India, insecure Indian cyberspace, etc. It is mandatory that economy have to push merits of Digitalization and check the problems arise from digitalization. In the era of Globalization, transactions are increasing. So that digitalization to be given priority for both quick and transparent transactions.

KEYWORDS

Digitalization, Challenges, Opportunities, Globalization, e-Surveillance etc.

INTRODUCTION

Digitization is the representation of an object, image, sound, document or signal by generating a series of numbers that describe a discrete set of its points or samples. The digital economy is the new productivity platform that some experts regard as the third industrial revolution. This is also known as 'The Internet Economy' or Internet of Everything (IOE) and expected to generate new market growth opportunities, jobs and become the biggest business opportunity of humankind in the next 30 to 40 years.

The momentum that 'Digital India' has given to our technological progress is noteworthy indeed. Digital India Program is a national campaign to transform India into a globally connected hub. It includes various proposals and incentives given to companies, the manufacturing companies both domestic and foreign to invest in India and make the country a digital destination. The emphasis of Digital India campaign is on creating jobs and skill enhancement in the Broadband Highways, e-Governance, and Electronic delivery of services, Universal access to Mobile Connectivity, Electronics Manufacturing, and Information for All etc.

The campaign's aim is to resolve the problems of connectivity and therefore help us to connect with each other and to share information on issues and concerns faced by us. In some cases, they also enable resolution of those issues in near real time. Digital India is an initiative of the Central Government of India "designed to transform India into a global digitized hub" by reviving a rundown digital sector of India with the help of improving digital connectivity and skill enhancement and various other incentives to make the country digitally empowered in the field of technology.

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DEFINITIONS

Integration of digital technologies into everyday life by the digitization of everything that can be digitized - **Business Dictionary**

Digitalization is the way in which many domains of social life are restructured around digital communication and media infrastructures. In the pages that follow, we discuss these distinct, yet interrelated, concepts - **Oxford Dictionary.**

Pillars of Digitalization

There are several pillars of opportunities that are going to be built to escalate public behavior and expectation in digital way:

Broadband Highways,
Digital Locker,
Mobile Connectivity,
e-Kranti,
Jobs,
Manufacturing,
MyGov,
Information for all,
Scope with Foreign Universities.

ADVANTAGES

The advantages of Digitalization include Customer experience, Technology push, and Economic benefits along with the following advantages.

Digital Empowerment of Native Indian People.
Delivery of all Government Services electronically (E-Governance).
A Digital Identification, which will verify the end user.
A Mobile for worldwide access to all services.
A Bank account for Immediate Benefit Transfers of subsidies and payments.
The program also aims to eliminate all electronics imports from foreign countries by 2020 and make India an electronics manufacturing super power.
It will help in decreasing crime if applied on whole.
It will help in getting things done easily.
It will help in decreasing documentation.
Some of the services, which will be provided through this desire effort, are Digital Locker, e-education, e-health, e-sign and nationwide scholarship portal.
It will ostensibly create many jobs.
It will be a boost to industry; both large and small enterprises.

DISADVANTAGES

***The following are disadvantages of Digitalization*:**

Government employment might reduce which in turn may lead to civil servants' unrest.
People will use free wifi just for time pass, which is current scenario in metros.
Illiteracy people may lose with digitalization, as they are not aware of it.
Cybercrimes may increase.

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It affects unemployment problem.

DIGITALIZATION IN INDIA

Digital India is a campaign launched by the Government of India to ensure that Government services are made available to citizens electronically by improving online infrastructure and by increasing Internet connectivity or by making the country digitally empowered in the field of technology. It was launched on 1 July 2015 by Prime Minister Narendra Modi. The initiative includes plans to connect rural areas with high-speed internet networks.

Digital India consists of three core components, they are

The creation of digital infrastructure.
Delivery of services digitally.
Digital literacy.

The vision of Digital India program is inclusive growth in areas of electronic services, products, manufacturing and job opportunities etc. and it is centered on three key areas – Digital Infrastructure as a Utility to Every Citizen, Governance & Services on Demand and Digital Empowerment of Citizens. The Government of India entity Bharat Broadband Network Limited that executes the National Optical Fibre Network project will be the custodian of Digital India (DI) project. BBNL had ordered United Telecoms Limited to connect 250,000 villages through GPON to ensure FTTH based broadband. This will provide the first basic setup to achieve towards Digital India and is expected to be completed by 2017. The government is planning to create 28,000 seats of BPOs in various states and set up at least one Common Service Centre in each of the gram panchayats in the state.

The 2016 Union budget of India announced 11 technology initiatives including the use data analytics to nab tax evaders, creating a substantial opportunity for IT companies to build out the systems that will be required. Digital Literacy mission will cover six crore rural households. It is planned to connect 550 farmer markets in the country with technology. Out of 10% English speaking Indians, only 2% reside in rural areas. Rest everyone depends on their vernacular language for all living their lives. However, as of now, email addresses can only be created in English language. To connect rural India with the Digital India, the Government of India impelled email services provider giants including Gmail, office and rediff to provide email address in regional Languages. However, the email provider companies have shown positive sign and are working in the same process. An Indian based company, Data Xgen Technologies Pvt Ltd, has launched world's first free linguistic email address under the name 'DATAMAIL' which allows to create email ids in 8 Indian languages, English; and 3 foreign languages – Arabic, Russian and Chinese. Over the period, Data X Gen Technologies will offer the email service in 22 languages.

OPPORTUNITIES

A Digital India Year would make sure that each aspect of the program is pushed to show results on the ground and not go into hibernation after one week of enthusiasm. Considering that most of the nine pillars of the Digital India program face serious challenges in implementation, it is imperative that focused; persistent attention is given to each of its pillars so that the big programme does not end up in embarrassment and failure. Considering that, the Digital Empowerment Foundation has a footprint at more than 150 locations in India at the village level, and that too with the purpose of digitally enabling the poorest of the poor, let me highlight some of the major challenges of the Digital India program.

First and foremost is that the entire program is designed as a top-down model. There is no idea of how it would be implemented on the ground to be successful. For example, let us consider six of the nine pillars of the programme directly related to consumers and people at large: broadband highways, universal access to mobile connectivity, public Internet access program e-kranti or electronic delivery of services, information for all, and IT for jobs. Besides these Broadband highways, now called Bharat Net, is supposed to connect up to gram panchayat, but laying fiber optic cables is the least of the challenges here. The biggest challenge is ensuring that each panchayat point of broadband is fired up, functional, used and distributed. Our research work found that more than 67% of the NOFN

points are non-functional, even at the pilot stage. Besides, if the broadband highways programme is not implemented well and soon, we may not be able to implement other pillars of the programme, such as the public Internet access programme, e-kranti, information for all, and even IT for jobs. All these are dependent on access infrastructure.

Out of the many initiatives launched during the Digital India week, one that could make a serious impact is BSNL's (Bharat Sanchar Nigam Ltd) mass deployment of Wi-Fi hotspots across the country. If the government pushes BSNL to ensure at least one hotspot per panchayat or per village, it can do wonders, and the government can show off this as a positive outcome. However, if the selection of the locations for the hotspots necessarily were those populated by mostly tribals, backward castes, and minorities and geographically difficult areas, then the impact would be something that would be a national story. A well-connected nation is a prerequisite to a well-served nation. Once the remotest of the Indian villagers are digitally connected through broadband and high speed Internet, then delivery of electronic government services to every citizen, targeted social benefits and financial inclusion can be achieved in reality. One of the key areas on which the vision of Digital India is centered is 'digital infrastructure as a utility to every citizen.

A key component under this vision is high speed Internet as a core utility to facilitate online delivery of various services. It is planned to set up enabling infrastructure for digital identity, financial inclusion and ensure easy availability of common services centres. It is also proposed to provide citizens with 'digital lockers' which would be sharable private spaces on a public cloud and where documents issued by government departments and agencies could be stored for easy online access. It is also planned to ensure that the cyberspace is made safe and secure. Over the years, various State Governments and Central Ministries to usher in an era of e-governance have undertaken a large number of initiatives. Sustained efforts have been made at multiple levels to improve the delivery of public services and simplify the process of accessing them. E-governance in India has steadily evolved from computerization of Government Departments to initiatives that encapsulate the finer points of Governance, such as citizen centricity, social responsibility, and service orientation transparency accountability.

The National e-Governance Plan (NeGP) was approved in 2006 to take a holistic view of e-governance initiatives across the country, integrating them into a collective vision. Around this idea, a massive countrywide infrastructure reaching down to the remotest of villages is being developed, and large-scale digitization of records is taking place to enable easy and reliable access over the Internet. The ultimate objective was to make all government services accessible to the common person in his locality, through common service delivery outlets, and ensure efficiency, transparency and reliability of such services at affordable costs to realize the basic needs of the common man.

For example if we take Communications and IT development, Today, Sanchar Bhawan is free from middlemen, there is no scam or scandal, and decisions are taken in a free and fair manner. We had the highest spectrum auction ever of 1.10 lakh crore (last year). All the policy initiatives pending for the past 710 years - defense band identification, spectrum-trading sharing, harmonization, liberalization, cloud policies, open source in IT and creating an ecosystem of sound investment - are in place. As a result, IT and IT enabled exports today are worth $108 billion, the highest ever in the history of India. India has received $4,091 million (over ₹26,000 crore) foreign direct investment in telecom. Mobile telephony has shown growth. The postal sector had tremendous growth of ₹122.66 million between April 2014 and February 2016. India crossed one billion mobile phones under our government, one billion plus Aadhaar cards and 400 million plus Internet users. On a lighter note, I can say that net addition in total telephony (mobile plus landline) from April 2014 to February 2016 is equivalent to the population of France and Italy put together. The growth rate of total telephony, which was 3.90 per cent in 201314, posted 6.76 per cent in 201415, and 5.65 per cent until February this year, and I am sure the rate must have crossed 6.50 per cent in March. This is the position - a clear growth - and what is important is the rural growth is more than the urban. Rural tele density has increased 6.62 per cent between February 2014 and February 2016. Therefore, the telecom sector is rising and with 'Digital India', it is going to rise further. My biggest personal satisfaction is the recovery of the postal department. Postal services have become the biggest deliverer of ecommerce items - there are more than 57 centres in the country, fully automated and computerized. The ecommerce parcel revenue, which was down 2 per cent in 201314, rose 45 per cent in 201415 and 80 per cent in 201516, and by February, it has reached 100 per cent.

CHALLENGES

The challenges of digitalization in India are as follows:

The initiative also lacks many crucial components including lack of legal framework, absence of privacy and data protection laws, civil liberties abuse possibilities, lack of parliamentary oversight for e-surveillance in India, lack of intelligence related reforms in India, insecure Indian cyberspace, etc. Some other challenges are:

Implementation: The entire program is designed as a top-level model on the technological front. There is hardly any guidance on how to implement the same on the ground level to make it successful. To be precise, most of the nine pillars of the program are directly related to high-end consumers in urban areas and not for 70% of the rural population in India.

Deploy W-Fi Centers & Hotspot: BSNL's (Bharat Sanchar Nigam Ltd) mass deployment of Wi-Fi hotspots across the country. If the government pushes BSNL to ensure at least one hotspot per village, it can do wonders and experience the positive outcome. However, if the selection of the hotspot locations were those populated by mostly tribal backward castes, minorities and geographically difficult areas, then the impact can bring a new era in the life styles and other culture of the people in our country significantly and also impact in other countries.

Improve IT Literacy: Improving IT literacy is very important because the entire mass who is using internet should know how to secure his/her online data. Providing proper usability guidance of Anti-Virus software and its role in securing the records should happen simultaneously to avoid illegal things in all the economic and other money transactions.

Data Vulnerability: Each citizen of India would have all the personal details online including bank details, Income tax details, PAN details that might be vulnerable if not secured properly. In case this is breached, then any individual would lose the privacy of the data and would be compromised. This leads to lose of personal money in the form digital transactions.

Excessive Server Hits: If majority of the population start using online, then definitely the Government portal sever will start getting more number of hits day by day. This is limitless and the IT team needs to be prepared to tackle the situation where the possibility of crash would minimize.

Man-In-The-Middle Attack: It is a type of cyber-attack where a malicious actor intrudes him/ herself into a conversation between two parties, imitates both parties and gains access to information that the two parties were trying to send to each other. A man-in-the-middle attack allows such intercepts of the data meant for someone else, without knowledge of either of the party until it is too late.

IMPACT OF DIGITALIZATION BY 2019

Broadband in 2.5 lakh villages, universal phone connectivity.
Net Zero Imports by 2020.
400,000 Public Internet Access Points.
Wi-Fi in 2.5 lakh schools, all universities; Public Wi-Fi hotspots for citizens.
Digital Inclusion: 1.7 Cr trained for IT, Telecom and Electronics Jobs.
Job creation: Direct 1.7 Cr. and Indirect at least 8.5 Cr.
e-Governance & eServices: Across government.
India to be leader in IT use in services – health, education, banking digitally empowered citizens – public cloud, internet access.

CONCLUSION

Since Technology advances as time passes every economy and individual has to adopt upcoming technology for digitalization. It is mandatory that economy have to push merits of Digitalization and check the problems arise from digitalization. In the era of Globalization, transactions are increasing. So that digitalization to be given priority for both quick and transparent transactions.

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INCREDIBLE NOVELTY IN DIGITAL COMMERCE: GRAB THE OPPORTUNITY TO CHANGE OR FADE AWAY LIKE E-COMMERCE

K. Prabhu Sahai[2]

ABSTRACT

E-commerce is getting faded; this is because what has worked in the past no longer does. Simply attributing your products on an online platform and spending money on promotion is not adequate to catch the attention of the embryonic shopper.

Plentiful have grasped that Digital Commerce is a more holistic way of doing business online. Digital commerce allows them to generate demand, control the supply chain, enhance the customer experience and provide sufficient data to analyse how to more effectively direct their marketing efforts in an integrated way.

Incredible novelty in the customer experiences through digital commerce is taking place such as Rebirth of Brick and Mortar stores, Photo Shopping, Augmented Reality, and Voice based SEO (search engine optimization) and this paper descriptively aims at detailed presentation on the latest novel and incredible ways of digital commerce.

KEYWORDS

Digital Commerce, Customer Experience, Photo Shopping, Voice SEO, Brick and Mortar store, Augmented Reality etc.

INTRODUCTION

The facility to promote, trade and serve through digital means has become a key expectation of all enterprises, an important aspect of digital commerce is its capability to embrace and enclose the complete, multi-phase Prism framework: a) Discover, b) Transact, c) Fulfil, d) Care, and e) Community. The digital channel is becoming increasingly more important as the source for generating new leads and customer acquisition. Potential customers will often use digital channels to find and explore offerings before engaging with field or inside sales. They expect rich content that goes beyond standard product information and they expect experiences tailored to their needs. Customers expect easy access to product information, case studies, videos, and evaluation products. Providing these types of capabilities allow companies to potentially identify leads earlier, while data collection and analytics tools allow companies to engage prospects with targeted offers earlier in the sales process.

OBJECTIVES

To unveil the latest and most advanced digital commerce experiences to be witnessed in the near future.
To discern the needs of the modern customers and various options of digital commerce available in the present scenario.

DESIGN / METHODOLOGY / APPROACH

This paper is descriptive in nature which aims to understand the conceptual perspective on incredible trends in digital commerce and customer experiences. Related review of literature is structured around the key components of customer experience in digital commerce era, perceptions about digital commerce, an innovative method of commerce viewed with a broad perspective.

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LIMITATIONS

Limited time to review the trends in digital commerce.
Handful Companies have adopted the latest trends in Digital Commerce.

REVIEW OF LITERATURE

Prahalad and Ramaswamy (2003) innovations need to start shifting the focus away from products and services and more onto customer experience environment, where the potential to success is better. Innovations are significant part of customer experience management and they are essential to gain and maintain competitive advantage. The need and demand to innovate is now Customer experience innovations greater than ever. In competitive environment value creation can only come from innovation.

Borowski (2015) mentioned in their study that while a strong customer experience has been shown to produce significant results, many companies still struggle to identify the specific plan of action to achieve those results.

Mesquita (2011) mentioned that E-trust appears in environments where direct and physical contacts do not happen, where moral and social pressures can be perceived differently, and where interactions are arbitrated by digital devices.

Liao and Cheung (2000:299) in their study observed that the rapid growth in the field of virtual shopping. With this emerging field of shopping the interest of marketers is also increasing in studying what actually motivates consumers to shop online. Fierce competitions among online sellers have forced them to gain the competitive edge in the field of virtual shopping.

NEEDS OF CUSTOMER

Suggestions for Similar Products: While buying anything, a consumer wants to explore as many products he or she can and a suggestion bar showing similar products would give your customers more options and can please him more.

A Properly Functioning Search Bar: It is an obvious but worth mentioning requirement. Every Mobile App and E-Commerce Website has a unique and convenient option i.e., Search Bar, but its effectiveness is something that you should take care of. Web users are now habitual with Google's auto-suggest feature and with advent of Google Assistant voice search has made a remarkable difference in the SEO (Search Engine Optimisation).

Ease of Comparing: It is very Common phenomena that consumers want to check, test the various options available from the similar products before purchasing, which facilitates them to take right decisions and thus get more satisfied, and they should have an option of comparing two similar products side by side mentioning the features and prices both.

Credible and Trustworthy Experience in Financial Transactions: A customer look forward to that the payment service he or she uses is protected, safe and sound. This safety can be guaranteed basically by providing protected transactions and a professional design payment options.

A Mobile Application: A mobile app has become inevitable today, which shape a good link between business and customer. Mobile Apps have become more novel in their approach to customer experience management.

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Figure-1

Sources: Authors Compilation

INCREDIBLE AND NOVEL TRENDS IN DIGITAL COMMERCE

The rising importance of e-commerce has essentially transformed the way business is conducted. It has changed the way a vast variety of products and services are now sold, from clothes, packaged goods and marine food to hotel bookings, music files, and cab services. As a result, companies in all sectors – whether big or small – cannot afford to close the eyes to this channel. Increasingly, businesses without a reputable digital commerce approach and implementation plan will find it hard to continue to exist. It is, therefore, of supreme importance for businesses to stay abreast of the popular trends in the digital commerce field.

Some of the innovative trends are being presented here with practical examples how they are implemented.

The Rebirth of Brick and Mortar

A new class of retail stores and in-person experiences, rooted at digital source will begin to substitute outgoing retailers. Brick and mortar players will digitize their material infrastructure and start on rolling out new store features and formats based on customer experience and convenience, with a strong digital flavour.

Online men's wear brand **Frank and Oak** has opened 16 physical stores in North America. The in-store experience includes premium coffee and barbershop services.

Nordstrom opened a 3,000 sq/ft store with no merchandise in order to focus on services and brand experience such as tailoring, try-on's, stylists and more, including fresh juice and manicures. The space doubles as a pickup and return point for online purchases.

Online box-mattress pioneer **Casper** has opened 15 pop-up shops in cities around the US in 2017.

Portland's **Velo Cult** stands out in a city with 80 bike shops by blending culture with retail. They carry a selection of new, custom and vintage bicycles, serve at least 12 craft beers on tap, roast and serve coffee on site and have a stage for local musicians.

Home Depot makes $5 Billion online, but its top priority remains a stellar store experience. Stores and staff support the customer journey for both DIY homeowners and professional contractors.

The **IRL** (In Real Life) pop-up shop in Chicago's Water Tower Place is a showroom for online-only brands to display their products.

Iconic Canadian parka brand **Kanuk**'s unique in-store experience includes a -25˚C (-13˚F) cold room to test jackets in real winter conditions.

Augmented Reality (AR)

Augmented Reality (AR) will be gigantic in 2018 as brands roll out features that permit consumers to use their mobile devices to foresee items in their home or office ahead of purchasing. From sofa to food processor, consumers will be able to see exactly how an article looks in their environment before ordering, big size items like furniture or

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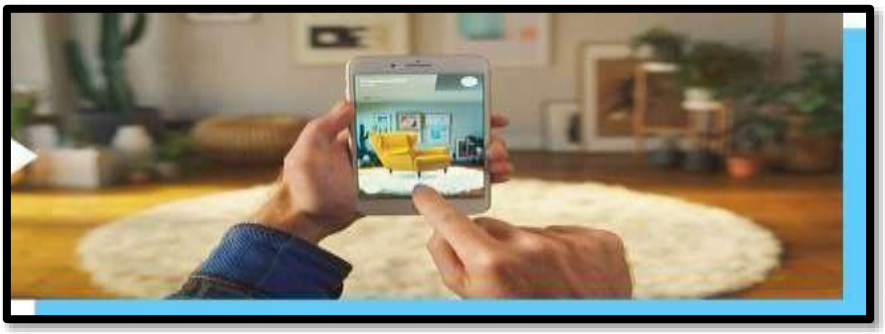
bathtubs should be visualized. This Feature will induce customers to order online for such items, it further boosts related shipping and payment services.

Houzz's app lets you take rooms in your house and then place multiple products within them, virtually, from a selection of 500,000 product images. The million users of Houzz's previous AR features were "11 times more likely to purchase and spent 2.7 times more time in the app".
Amazon added augmented reality directly into its existing, conversion-focused app's search function. The AR view feature lets you view thousands of products in your home and office before you buy them, including electronics and tools.
IKEA Place is an augmented reality app that lets consumers experience, experiment and share adding Ikea products into any space. Products are in 3D and true to scale, so consumers can see whether the furniture or accessory will fit and what it would look like in context.

Figure-2



Sources: Authors Compilation

Voice SEO

Companies are gearing up for meeting the Consumer needs who are using more and Voice SEO in their devices to speak and use voice to interact (Conversational AI) like never before. Retailers, merchants and brands will have to change the way they converse. For digital commerce, the principal repercussion will revolve around in-depth product information being companionable / optimized with voice search and making store inventory available in real-time.

Domino's skill allows users to order pizza by voice, and even check order status.
Lyft's users can order rides directly from the Amazon's Alexa device.
Walmart made hundreds of thousands of items easy to order by voice on the Google Express e-Commerce Platform, soon adding the ability to place orders for in-store pickup through Google Home. Similar agreements are in the works for Target, Costco, Kohl's, Bed Bath & Beyond, Staples, Walgreens and more.

Photo Shopping

As an alternative of Keying, many consumers are interested and will use image-based search for the first time in 2018. In fact, picture and voice activated search may make up 50 percent of all searches by 2020. As image analysis automation becomes standard in mobile devices, customers will be able to take a picture of an object then search for that exact product or a similar one. Merchants who incorporate this capacity into their digital approach will be richly rewarded. First, their product information management investment will reach new levels of ROI. Further, they will be able to enter new markets based on the excellence and diversity of the images they provide for their products, as language is no longer an obstacle to finding, nor is product name or erroneous or unknown characteristics will be hurdle.

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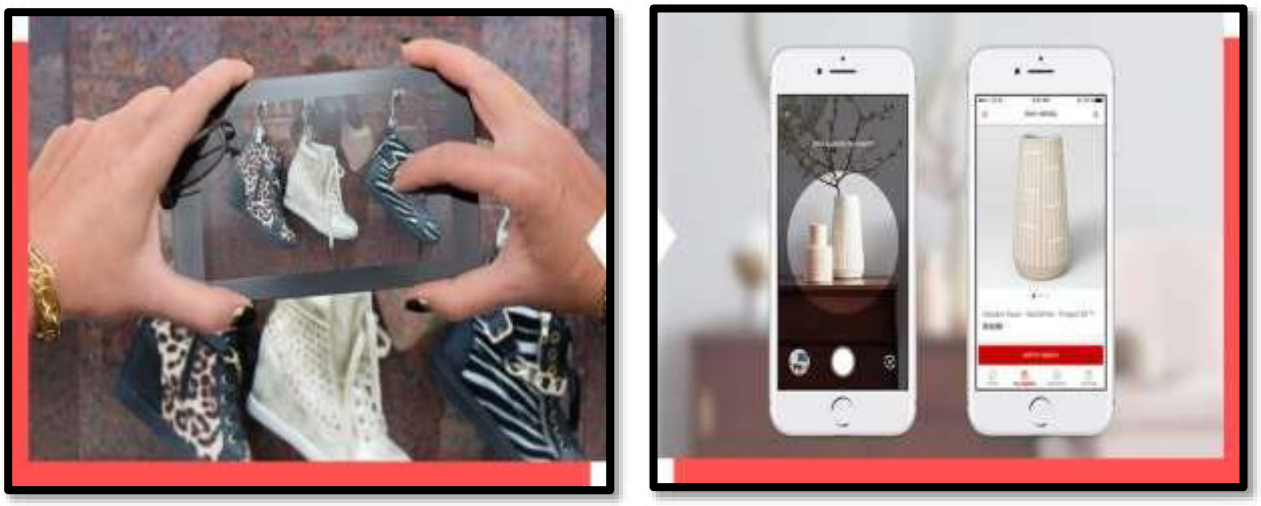
Figure-3



Sources: Authors Compilation

eBay's visual search tools allow users to use their own photos or those found online – a favourite blog or website, for example – to run an eBay search for similar products.

Pinterest has invested heavily in visual search technology in order to turn the Smartphone camera into a search engine for products.

Target will integrate Pinterest's visual search technology – Lens – enabling shoppers to snap a photo of any product, and then find similar items available at Target.

Houzz's Visual Match scans photos on the platform and identifies similar products available in the Houzz Shop, which features more than 8 million home decor items.

CONCLUSION

The online Indian shopper is establishing themselves as matured and has expectations equivalent to worldwide customers.

Digital Commerce/ E-Commerce businesses in India need to live up to these expectations.

The E-Commerce business in India may at present be behind its counterparts in a number of developed countries and even some up-and-coming markets. However, with India's GDP growth pegged at 6.4% by the International Monetary Fund and the World Bank, it is expected to grow rapidly. Furthermore, the Indian e-Commerce industry has way in to funds from domestic and international investors. Overall, the E-Commerce sector is maturing and a number of serious players are entering the market.

There are mammoth prospective aspects for e-Commerce companies due to the increasing internet user base and advancements in technology. However, they have to face challenges may be operational, strategically; regulatory or technological. Success depends on the how these companies meet the challenges.

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THE RESEARCH OF BIG DATA ANALYTICS OF PRIVACY PRESERVATION IN UBIQUITOUS ENVIRONMENT

Suneetha V.[3] Dr. Y. S. Kumara Swamy[4] Ramakrishnan M. R.[5]

ABSTRACT

Big data analytics has created opportunities for researchers to process huge amount of data but created a big threat to privacy of individual. Data processed by big data analytics platforms may have personal information, which needs to be taken care of when deriving some useful results for research. Existing privacy preserving techniques like, anonymization requires having dataset divided in the set of attributes like, sensitive attributes, quasi identifiers, and non - sensitive attributes. With the organized data, it may possible to have such a distribution but in unstructured data, it is very difficult to identify sensitive attributes and quasi identifiers. The development of the Data Science, Sets off the third waves of the world information industry. The data mining technology plays a vital role in the development and promotion of Data Science and ubiquitous environment, but it causes leakage problem of privacy information at the same time. In the light of the data mining association rules and randomized response method. We propose a new method, suppressible randomized response method (SRRM), and introduce the data mining algorithm of privacy protection based on SRR. Finally, this paper evaluates the privacy of the method.

KEYWORDS

Big Data Analytics, Data Science, Data Mining, Association Rules, Privacy Preserving, Ubiquitous Environment, Randomized Response etc.

INTRODUCTION

Gaining access to high-quality data is a vital necessity in knowledge-based decision-making. However, data in its raw form often contains sensitive information about individuals. Providing solutions to this problem, the methods and tools of privacy-preserving data publishing enable the publication of useful information while protecting data privacy.

Privacy preservation is crucial in ubiquitous computing environment. Without this, users feel uneasy to use and live in the UC environment. The implementation of privacy safeguard or privacy enhancing technologies is going to be a long road. Understanding the challenges & issues of privacy protected in ubiquitous computing, is helpful to design and implement privacy aware system. In this paper, we try to describe privacy in ubiquitous computing briefly.

Big data can be defined as, "The data sets so large so large or complex that are difficult to process using traditional data processing applications". Size of big data may be in zeta bytes (increasing proportionally with time). Big data has characteristics of 3Vs; Volume (large amount of data), Velocity (speed of data generation and processing), and Variety (structured, unstructured, or semi-structured data).

Big data analytics is very helpful in various fields like, medical science, national security, semantic web, social media, etc. On the other hand, it creates threat to an individual as it has capacity to store and process large amount of data very quickly and accurately, due to advancement in technologies like, NoSQL data models, Hadoop, Map- reduce, etc. Therefore, instead of seeing the picture as big data analytics vs. privacy, we need to have individual privacy preservation with almost all advantages of big data analytics. A privacy preserving technique is required,

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which maintains a trade-off between privacy and utility of individual's data. To understand the importance of privacy in big data analytics, privacy issues with big data analytics have been discussed. The Internet of Things is a new system that can communicate with the real world. It is also a virtual network including the ubiquitous data perception, the information transmission mainly by wireless and the intelligent information processing through the sharing information platform. In today's world each individual wish that his private information is not revealed in some or the other way. Privacy preservation plays a vital role in preventing individual private data preserved from the praying eyes. Anonymization techniques enable publication of information, which permit analysis and guarantee privacy of sensitive information in data against variety of attacks. It sanitizes the information. It can also keep the person anonymous using encryption technique. There are various anonymization techniques and algorithms available, which are discussed in this paper.

The wide application of Internet of Things in the production and living must be with more knowledge discovery. In this process, the data mining technology plays a positive role. The data of the sharing platform on the Internet of Things most comes from the data being closely related to people's life, such as position, environment and habits of work and living. These data are sensitive information for most users, and some malicious users cannot access them. Therefore, we have to consider the privacy leakage problem in the sharing platform on the Internet of Things.

Everything is available on mobile nowadays. People are sharing lot of information on mobile phones. Often, mobile sends data to the service provider without user's knowledge. Identifying the person using his mobile data and the details provided by the service provider is very easy. Therefore, privacy in mobile data is very important. Text message analysis is an example of unstructured big data analytics in mobile. Mobile application like WhatsApp is using text message analysis in their mobile number verification method. In such method, a verification number sent to the registered mobile number and if it is same in which app is installed, app will automatically write the number in verification box as soon as it arrives via SMS.

PRIVACY ISSUES IN HEALTH CARE DATA

Big data analytics and genome research having real time access to patient record helps doctors to take decisions. Electronic Health Records (EHR) helped a lot to digitize the health care system and EHR incentive program motivates hospitals to create an accurate and complete EHR. On the other hand, EHR having personal information of patient may lead to privacy breach. Therefore, privacy-preserving analysis is required and data need to be anonymized or encrypted before data analysis.

Privacy Issues in Social Media Data

Social media is one of the biggest revolutions in past decade. People on social media are sharing Lot of information. Sometimes, people close to you shares some information about you, which you do not want disclose on social media. This may lead to privacy violation of an individual. For e.g.; you have taken a sick leave from office to watch a cricket match and one of your friend checked-in, you on Facebook so people comes to know that you were not sick but enjoying match. Though, privacy settings are there in Facebook to approve tag so if someone tagged you, it need to be approved before it is posted on your wall but it is going to appear on your friend's wall as soon as he is posts with link to your profile.

Privacy Issues in Web Usage Data

Intel want to make its internal website dynamic (appearance of the website changes as per the access pattern of users, viz. links visited by most number of users should be on the first page to save click time and improve productivity) based on web usage data of all the users of the website. With browser information and IP address from web usage data any user can be identified and whatever activities he is performing on line may be detected. Therefore, user privacy is violated by such system. Sedayao et al., have suggested a model in which symmetric key encryption is used to anonymize the sensitive data identified based on predefined tags like, IP address and user ID from semi structured web usage data.

RELATED CONCEPTS AND WORK

Data mining is to extract knowledge people are interested in from a large number of data. **The association rule is one of them, the definition is as follows:**

The following is a formal statement: Let $I = \{i_1, i_2,.....i_k\}$ be a set of items. Let D be a set of transactions, where each transaction T is a set of items such that $T \subseteq I$. We say that a transaction T contains N, a set of some items in I, if $N \subseteq T$. An association rule is an implication of the form $N \rightarrow Y$, where $Y \subseteq I$, and $N \cap Y = \phi$.

The one of the data mining methods in privacy preserving of randomized response method firstly put forward by Warner. The randomized response technology means when we use a random turning needle to handle and involve sensitive problems. if a sensitive problem has two options, Y and N, the needle is only seen by respondents and it respectively points to Y and N with fixed probability. Finally, according to the probability distribution of needle pointing, investigators get the maximum likelihood estimator of option Y and N taking shares respectively in investigation. Based on it, this proposes a new randomized response method -- suppressible randomized response method (SRRM), which makes the original data be hidden before mining.

SUPPRESSIBLE RANDOMIZED RESPONSE METHOD (SRRM)

In order to express more intuitively, we assume that the data is the data set of market basket. Each commodity is an item with an identified number, customer' each shopping is a transaction, which is expressed by sequence of {0,1}, and the length is the total number of items.

The suppressible randomized response method is firstly exchanging and hiding the original data before the mining of data without the limit of alternatives of randomized parameters. In addition, the specified methods are as follows:

Firstly, giving randomized parameter p_a, a = 1,2,3, $0 \leq p_a \leq 1$, and $\sum p_a = 1$, and then set $f_1=n$, $f_2=1$, $f_3=0$, in the item n, $n \in \{0,1\}$, and the pi probability selected value of randomized function f(n) is f_j j=1,2,3.

To set the items of total number is x, the transaction $N=(n_1,n_2,....n_x)$ which is expressed by a sequence of {0,1} and the distributed transaction $R=(r_1,r_2,...r_x)$ can be calculated through function R = F(N), and $r_i = f(n_i)$. That is to say, the value of r_i is n_i with the probability of p_1 similarly p_2 equals the probability of n_i and p_3 equals the probability of 0.

THE MINING TECHNOLOGY BASED ON SRRM

By the data transformation and data hiding of SRRM, transaction sets D can get a forged transaction sets D'. In the progress of generating the frequent item sets, the most crucial point is to figure out the support of item sets. We will introduce how to compute the support of k-itemsets in the following discussion, and then give the mining algorithm based on Apriori algorithm.

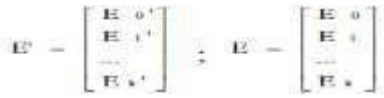
Computing the Support of k-Itemsets

Let $A= \{i_1,i_2,....,i_k\}$ is a k-itemsets. In the case of every item in A, which will be handled by the same randomization parameter, we can make use of some optimization strategy to reduce the computing complexity of the item sets support. When every item in A uses the same randomization parameter, transaction in D including Ai will have the same rate with transaction in D' including Ai which has been handled by SRRM. That is the reason.

$$I_{ij} = \sum_{t=\max(0,i+j-k)}^{m(i,j)} E_j^t * (P_1 + P_2)^t \, P_3^{j-t} * E_{k-j}^{i-t} * P_2^{i-t} * (P_1 + P_3)^{k-i-j+t} \quad (1)$$

Regarding to k-itemsets A, and transaction T in D, there are k+1 possible value in $\{T \cap A\}$. We take the serial sequence E_0, E_1,....E_k as the ratio of every transaction in D. For example, as a 3-item sets, all the transactions in D

will be divided into {000}, {011,101,110},{111}, and E2 is the ratio of two items in A. Similarly, for the transaction T' in D', there are k+1 possible values in |T' ∩ A| as well. Similarly, for the transaction T' in D', there are k+1 possible values in |T' ∩ A| as well. We also take the serial sequence E_0',E_1'....,E_k' as the ratio of every transaction in D'.



Then we have E' = LE, and; L = [I_{ij}] is a (k+1)x (k+1) matrix. L_{ij} exactly represents that D including Aj, changes into a ratio in D' including Ai after it is handled by SRRM.

If L is reversible, let L-1 = [a_{ij}], E= L-1E', yet E_k is just the support of k -itemsets which we are computing.

$E_k = a_{k,0}E_0' + ak,1E_1' + ...+a_{k,k}E_k'$ (2)

Firstly, according to D', we can get E_j' and solve $a_{k,j}$ using L, then the support of k-itemsets A comes out. The time complexity and space complexity of this algorithm is O(k).

In addition, we need to notice E0'+E1'+.....+Ek' =|D'| = N, so, there is one item among all the E_j' can be obtained without any computing. Generally, the value of E_0' is bigger than anyone else. Because of this reason, we can get the value of E_0' by way of E_0'

$= N - (E_0' + E_1' + ... + E_k')$.

The Complete Mining Algorithm

Using the computation formula mentioned above, we can figure out the association rules in which we are interested with the help of various frequent item sets generation algorithm available. In this paper, using Apriori algorithm, here is the specific frequent item sets generative algorithm, which has been handled by SRRM.

Input: D': The transactional databases handled by SRRM:
min_sup: The minimum support count threshold.
output: M : frequent itemsets in D'
scan D', for each item i ϵ I count i.count;
Mi = {i ϵ I |, ((i.count /N) - p2) / p1 ≥min_sup};
for (k=2;$M_{k-1} \neq \phi$; k++)
E_k = apriori_gen (M_{k-1}); // Generate candidate k-itemsets E_k
for each transaction t ϵ D' // scan D for counts
for (j-1; j ≤k; j++)
$E_{i,j}$ = partial_subset (E_k,t,j); // transaction t just
contains candidates k-itemsets of item j
for each candidate eϵE_{ij}
e.count++;
for each candidate e ϵ E_k
e.count = a_{ko}.e.$count_0$ + $a_{k,1}$.e.$count_1$+....+a_k,k.e.$count_k$;
Ek = {eϵ E_k | e.count ≥min_sup;
return M =UkM_k;

PRIVACY ASSESSMENTS

The original intention and ultimate goal of research of privacy protection data mining methods is to do data mining and knowledge discovery, and search the potential, valuable patterns and rules based on the premise that protects privacy data properly, therefore, the level of privacy has become the primary factor when evaluating a kind of method.

According to the calculation formula of privacy damage coefficient B[4]:

$B = P_{\text{ratio of real data}} X P_{\text{probability of real data recognized}} + P_{\text{ratio of non real data}} X P_{\text{probability of non real data recognized}} X P_{\text{probability of non-real data reverted}}$.

Assuming that the ratios of real metadata in all method are the same, computing the privacy damage factor:

Randomization parameter p_1=p. We take the value $p_2 = p_3=(1-p_1)/2$. In this way, the probability of being 0 and 1 of non-real data will be exactly same, and cannot be reverted. Otherwise, non-real data will be possible to be recognized and then reverted. E.G., if we have $p_2 =1-p_1$, $p_3=0$, then all the data having the value of 0 that has been handled is real data, thereby the protection degree will be reduced greatly. This method, which takes the average value of 0 and 1 in practice, is not only convenient but also in favor of privacy preserving.

In this case, $B = p1 \frac{p1}{2} = \frac{2p}{p+1}$,

when $0 < p < \sqrt[1/]{2}$, it is a relevant ideal selection range of randomization parameter, and better in privacy.

CONCLUSION

In this paper, we proposed a new method of randomized response -SRRM. Then for the data which handled after SRRM, by giving a simple and highly efficient algorithm to create frequent item sets, finally to realize a new mining methods of updated associated rule of privacy preserving. We have also analyzed the SRRM way to choose the randomized parameter to strengthen the data's privacy. In brief, the privacy preserving of sharing on ubiquitous environment will be one of the hotspots and focal points of Internet of Things industry's development and study, but whether in one of the theoretical level or in the technical level both of them have many problems, which need further investigation and discussion. We hope that more and more effective privacy - preserving data mining algorithms will be proposed and they will play an important role in the application of the IOT and seamless connectivity in the future.

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IMPACT OF SECURE TRANSACTIONS ON SELECTION OF PAYMENT PLATFORM: A CONSUMERS VIEW POINT

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ABSTRACT

Electronic Payment Systems (EPS) have been enhancing people's personal satisfaction through giving ease of payment to online exchanges. The effects of trust and security on the use of EPS have for some time been recognized in e-commerce literature. However, very few studies have examined these two concepts from the viewpoint of users. This Paper has developed a conceptual model to examine the determinants of perceived security and trust and the effect of perceived security and trust on the use of EPS. A sample of 100 respondents was analyzed; the discoveries indicate that both perceived security and trust have a critical influence on EPS use. Technical protection and experience have been observed to be the basic determinants of perceived security and trust.

KEYWORDS

Electronic Payment Systems (EPS), e-Commerce, Security & Trust etc.

INTRODUCTION

Before we go ahead with the options available today in the Indian context for Electronic Payment systems, it is very important for us to understand the actual meaning of the same and the purpose behind such an intervention and its impact on the Indian economy and how it is perceived from a global best practices perspective. More importantly the need to understand when the same becomes relevant from an Indian perspective and the key rationale to take up this study.

India, thru the brilliant and futuristic approach of the Reserve Bank of India's policies have always been a few years ahead of the rest of the developed nations when it comes to safeguarding and protecting money. Ancestrally, we are a nation that has invested well in safeguarding the money earned and is spent prudently in the best means known. Securing money and wealth have been always innovative, trade/barter has found very eminent space in our economy and we have tried our level best to restrict the usage of large transactions without the need for currency. India today is in a situation where individuals, corporates and the financial regulator, value transparency, security and speed of transactions. We are in the cusp of a new generation, which is well informed, technologically savvy, inquisitive and experimental in the way they approach personal finances and transaction handling. Ease, comfort, flexibility are some of the by-products of such behavior. Given the demographic dividend of this country, the influence of mobile technology and connectivity thru internet penetration have enabled individuals the freedom of choice and to complement this, is the choice of options thru which one can pay. Given that the cost of production of currency (including cost of printing, safeguarding, transportation, pilferage, and loss) is more than the value of currency for upto the Rs. 100/- value bearer note, it is but prudent that we devise alternative ways thru which we are able to supplement the need, usage, circulation of such currency.

Globally, while India has been practicing electronic money transfer for over half a decade now, developed nations are yet to get to the security standards and the low risk levels that are demonstrated by the Indian prescribed electronic payment systems network and are trying to emulate the Indian context of digital transactions across the globe.

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Given the aforementioned reasons, and the responsibility of being a forerunner in innovative digital transactions and payment systems, it results, as our duty, to build more future forward products and services to enable more secure modes of seamless payments. In order to do so, it is more than critical to understand the underlying expectation from such electronic payment systems. In order to do so, it is important to appreciate the underlying security and trust expectations from users. This research attempts to understand the need for such systems and studies the hypothesis of security and trust associated with electronic payment systems.

INTRODUCTION TO CASHLESS TRANSACTIONS

Cheque: The cheque is one of the oldest methods of cashless payment. It is a known method to everyone. In this method, you issue a cheque for the specific amount to someone else. The cheque is deposited in the respective bank. The bank processes a payment through a clearinghouse. The entire transaction done through cheque is recorded and there is a proof of payment. However, there are instances where cheque payments are dishonored due to signature mismatch or insufficient fund. In order to avoid such issue, we can use other cashless payment options.

Demand Draft: Demand draft is another rudimentary way of cashless transaction. It is safest option to receive payment from anyone. Demand draft (DD) never is defaulted as the banker signs it. The disadvantage of DD and cheque is you need to visit a bank in order to deposit cheque and demand draft. The clearance of cheque or DD takes additional time.

Online Transfer – NEFT or RTGS: The third simplest method for the cashless transaction is online transfer using NEFT or RTGS. In order to do online money transfer, you need internet banking facility. Online transfer using NEFT or RTGS is comparatively faster than cheque or DD. Online transfer can be done from anywhere using internet facility.

Credit Card or Debit Card: Credit card or debit card is another cashless payment method. The usage of credit card and debit card was limited in India. However, usage of credit card and debit card is increasing now because of demonetization. The limitation of this payment method is an availability of swipe card facility (PoS) at merchant end.

***E-Wallets*:** E-Wallet is next cashless payment option. E-Wallet can be used to purchase products starting from grocery to airline tickets. In order to use E-Wallet customer and merchant, both require a smart phone with active internet connection. The most popular example or E-Wallet is PayPal. After registering for E-Wallet, you need to link your credit card or debit card with your E-Wallet id. You can use E-Wallet for fund transfer or online shopping. It is simplest cashless method.

Mobile Wallets: The next cashless payment method is a mobile wallet. You do not need a debit card, credit card or internet-banking password for making payment using a mobile wallet. Just load money in your wallet via IMPS and use it on the move. You can download mobile wallet app from play store. Few examples of mobile wallets are Paytm, PayUmoney, MobiKwik, etc.

UPI Apps: UPI is a mobile payment system, which allows you to do various financial transactions on your smartphone. UPI allows you to send or receive money using virtual payment address without entering bank information. Merchants can enroll with banks to accept payments using UPI. Like in the case of a PoS machine, the merchant would require a current account with a bank to accept UPI payments. The examples of few UPI Apps are SBI Pay, Union Bank UPI App, Phonepe, etc.

Gift Card: The next cashless payment method is a gift card. Gift card is a readymade card and can be purchased from a merchant or from the bank. The gift card is loaded with a fix cash amount you can purchase any item from the specific vendor by using a gift card.

Aadhaar Enabled Payment System: Aadhaar Enabled Payment System (AEPS) is one of the best cashless payment methods. AEPS is like Micro ATM it uses smartphone and a fingerprint scanner for the transaction. In order to use this facility, it is mandatory to link your Aadhaar card to your bank account. You can use AEPS in order to perform transactions like Aadhaar to Aadhaar fund transfer, Cash withdrawn, Cash deposit, etc.

Unstructured Supplementary Service Data: You can use USSD cashless option if you do not have a smartphone or internet connection. Unstructured Supplementary Service Data is mobile banking service. From any mobile phone, you can dial *99# and use this service. You can do all these things, which are available to a person with smartphone and internet connection. Almost including SBI, ICICI, BOB, Axis Bank and PNB supports USSD payment option.

LITERATURE SURVEY

From the article "Technology Fountain: Digital currency." by Pooja Bali [1] where it explains that there are various innovative money payment systems in the market today, many of which are built on platforms like the mobile phone, the Internet, and the digital storage card. These alternative payment systems have seen encouraging or even continued growth, from the likes of PayPal, Apple Pay, Google Wallet, Alipay, Ten pal, Venmo, M-Pesa, BitPay, Moven, BitPesa, Pay Lah!, Dash, FAST, Transfer wise, and others. Beyond payment systems that are based on fiat currency, the growing use of digital currency allows for faster, more flexible, and more innovative payments and ways in financing goods and services. One digital currency, however, stands out among the rest. Bit coin is one of the most well-known digital currencies today. To be specific, Bit coin is a crypto currency, which is a subset of what is generally known as a digital currency. Bit coin is a unique crypto currency that is widely considered the first of its kind. Like many created after it, Bit coin uses the power of the Internet to process its transactions.

According to "The Annual Report on the Working of the Reserve Bank of India", [2] the assessment and prospects shows that Headwinds from the global slowdown and the transient impact of demonetization notwithstanding, the Indian economy demonstrated resilience in 2016-17, marked by moderate expansion and macroeconomic stability - low inflation, and improvement in current account and fiscal deficits. Financial markets priced in global and domestic shocks and volatility ebbed, with excess liquidity conditions induced by demonetization persisting through the second half of the year. In this milieu, the outlook for growth in 2017-18 has brightened, with the likelihood of another favorable monsoon and the implementation of major policy reforms – led by the introduction of the Goods and Services Tax (GST) from July 1, 2017 - that would help to unlock bottlenecks to growth. The likely normal southwest monsoon for the second successive year is expected to boost rural demand besides keeping a check on food inflation. Urban consumption too is expected to remain buoyant, following the upward revision in the house rent allowance (HRA) to central government employees as also the likely implementation of the 7th Central Pay Commission (CPC) award at the state level. With further progress in implementing policy, reforms that ease doing business, India may continue to be a preferred destination for foreign direct investment (FDI). Improvement in external vulnerability indicators and fiscal credibility should boost business and investment sentiment. The sluggish growth of industry and fixed capital formation, however, remain areas, which warrant priority in policy attention. The progress in resolving the highly indebted corporates and improving the financial health of public sector banks (PSBs) is critical for restarting credit flows to the productive sectors, apart from reviving the investment climate, in general. The attainment of the inflation target under the new monetary policy framework should strengthen the transparency, credibility and effectiveness of monetary policy, which would anchor the progress of reforms going forward.

According to Charan Singh in the article, "India since Demonetizations" [3] shows that how in India, tax to GDP ratio, at around 18 percent, and is amongst the lowest in the world, probably because India, as mentioned in the Union Budget of 2017-18, is a tax non-compliant country. Tax evasion and corruption are deterrent to economic growth. Given that India is an emerging country, there are extensive infrastructure requirements, which need high development expenditure. There is an immediate and constant need for resources, which are of non-debt in nature to ensure respite from the existing level of high interest burden. Demonetizations are a step in ensuring an honest tax regime, better tax collections, and lower dependence on borrowings.

From the article "Impact of Bitcoin as Word Currency" by A. Seetharaman et. al. Which suggests that in an era of technology advancement when the entire world is talking about the "Internet of Things" [4] the things are going to be expected to have connectivity between anything and not everything, Currency can be left behind. Paper currency is bound to be a thing of past, as virtual currencies will start taking over and Bitcoin is well poised to achieve this feat. Not only it will revolutionize the way payments are made, but also have potential to affect the future of world currencies like USD, which is already facing challenges from EURO or Chinese Yuan Renminbi (CNY). The rise of crypto-currencies will add a new dimension to this challenge for US Dollar (USD) The focus of this study is to

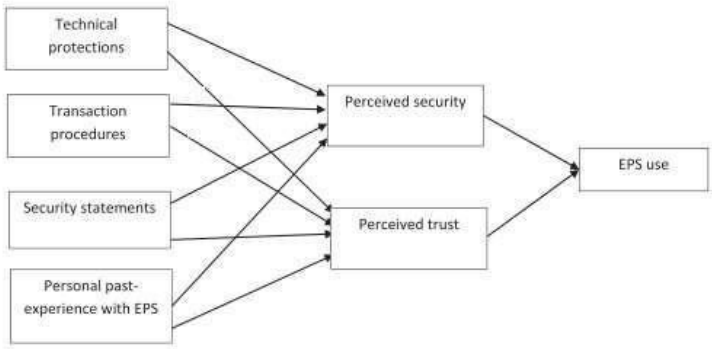
understand multiple factors which are translating Bitcoin (BTC) that is gaining momentum in various fields of global finance and how disruptive it can be, including replacing main fiat currencies in the financial system impacting mainly USD. The key variables studied are Regulation or lack of it around Bitcoin, Bitcoin Technology, Bitcoin Economy and the usage of Bitcoin as a Currency. The research uses the latest statistical tool ADANCO 1.1.1 by Henseler and Dijkstra (2015) to analyze the data collected by building a partial least squares structural equation model (PLS-SEM). The observations of the study helps in understanding the future of global finance from multiple standpoints, especially Regulation, Cryptocurrencies and the fiat currencies.

According to I. Sundar in the paper titled "Demonetization Scenario in India" [5] explains about the current form or forms of money is pulled from circulation and retired, often to be replaced with new notes or coins. Sometimes, a country completely replaces the old currency with new currency. The paper deals with Impact of Demonetization on Economy. It also outlines the effects of demonetization on GDP growth and impact of demonetization on business. The paper also makes a special note on merits of demonetization. This finding of the paper shows the policy suggestions. The Demonetization step is considered as the biggest cleanliness drive against the black money in the history of Indian economy. As per RBI, 87% transactions in India are cash transactions and corrupted people to build a parallel economy with unaccounted money use this loophole. This parallel economy helps in terror financing which in turn hampers the growth and development of country. Currently high- values notes account for total value of 86% of the notes in circulation in India. It is expected that this step will help in reducing the fiscal deficit of India and promote the cashless economy in India, which can be easily monitored.

The article is titled "2017 Public-Private Analytic Exchange Program" [6]. It explains about Global Regulation, which explains about Crypto currencies, due to their decentralized nature; do not fit easily into existing regulatory definitions and structures. The borderless nature of crypto currencies and the absence of an identifiable "issuer" of the instrument pose challenges to regulators; worldwide regulators have been both highly reactive and cautious in regulating crypto currencies. Regulatory responses have ranged from providing no guidance or regulation, to issuing warnings, prohibiting banks from buying and selling crypto currencies, regulating certain actors in the crypto currency ecosystem (e.g., wallet providers and exchangers), and banning crypto currencies altogether (Bangladesh, Bolivia, Ecuador, Kyrgyzstan, and Saudi Arabia). The Financial Action Task Force—the global anti-money laundering (AML) standards setting body—in 2015 provided its members with guidance for a risk-based approach to virtual currencies, which clarifies the application of FATF AML Recommendations to convertible virtual currency exchanges and helps national authorities develop regulatory responses.

RESULTS & DISCUSSION

Figure-1: Conceptual Model of Security and Trust in EPS Use



Sources: Authors Compilation

Table-1: Reliability Test

Cronbach's Alpha Test			
		N	%
Cases	Valid	100	100.0
	Excluded[a]	0	.0
	Total	100	100.0

Note: a. List wise deletion based on all variables in the procedure.

Reliability Statistics	
Cronbach's Alpha	N of Items
.921	106

Sources: Authors Compilation

Number of Questions examined in the Questionnaire was 106, none of the questions was excluded, a total of 100 Respondents were considered for Pilot Study. The Cronbach's Alpha value was 0.921, which indicates the Questionnaire is valid, acceptable and reliable

Hypothesis Testing

Statement-1: To Understand the Influence of Trust and Security on Selection of Cashless Transactions.
Null Hypothesis H_0: There is no Impact of Trust and Security on Selection of Cashless Transactions.
Alternate Hypothesis H_1: There is Impact of Trust and Security on Selection of Cashless Transactions.

ANOVA TEST

Table-2: Mean, Standard Deviation, Lower Bound & Upper Bound, Minimum and Maximum Values of Variables considered for the Study

		N	Mean	Std. eviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Do you feel confident to transact online wherever facility are available	Graduation	54	2.26	.757	.103	2.05	2.47	1	3
	Under Graduation	30	2.67	.711	.130	2.40	2.93	2	4
	Post Graduation	16	2.00	0.000	0.000	2.00	2.00	2	2
	Total	100	2.34	.714	.071	2.20	2.48	1	4
Do you find it secure & safe for transactions?	Graduation	54	2.48	.795	.108	2.26	2.70	1	3
	Under Graduation	30	3.20	.664	.121	2.95	3.45	2	4
	Post Graduation	16	2.25	.447	.112	2.01	2.49	2	3
	Total	100	2.66	.794	.079	2.50	2.82	1	4
Do you use two factor authentications where it is available?	Graduation	54	2.30	.768	.105	2.09	2.51	1	3
	Under Graduation	30	2.87	.819	.150	2.56	3.17	2	4
	Post Graduation	16	2.25	.447	.112	2.01	2.49	2	3
	Total	100	2.46	.784	.078	2.30	2.62	1	4
Adaptability by All wherever Transactions are involved	Graduation	54	2.04	.643	.088	1.86	2.21	1	3
	Under Graduation	30	2.40	.724	.132	2.13	2.67	2	4
	Post Graduation	16	2.25	.447	.112	2.01	2.49	2	3
	Total	100	2.18	.657	.066	2.05	2.31	1	4
Request Money Access to Friends	Graduation	54	2.04	.643	.088	1.86	2.21	1	3
	Under Graduation	30	2.40	.724	.132	2.13	2.67	2	4
	Post Graduation	16	2.25	.447	.112	2.01	2.49	2	3
	Total	100	2.18	.657	.066	2.05	2.31	1	4

Sources: Authors Compilation

Table-3: Sum of Squares, Mean Square, F Value and Critical Variables considered for the Study

ANOVA						
		Sum of Squares	**d.f.**	**Mean Square**	**F**	**Sig.**
Do you feel confident to transact online wherever 2fa facility are available	Between Groups	5.403	2	2.701	5.818	.004
	Within Groups	45.037	97	.464		
	Total	50.440	99			
Do you find it secure & safe for transactions?	Between Groups	13.159	2	6.579	12.950	.000
	Within Groups	49.281	97	.508		
	Total	62.440	99			
Do you use two factor authentications where it is available?	Between Groups	7.114	2	3.557	6.422	.002
	Within Groups	53.726	97	.554		
	Total	60.840	99			
Adaptability by All wherever Transactions are involved	Between Groups	2.634	2	1.317	3.184	.046
	Within Groups	40.126	97	.414		
	Total	42.760	99			
Request Money Access to Friends	Between Groups	2.634	2	1.317	3.184	.046
	Within Groups	40.126	97	.414		
	Total	42.760	99			

Sources: Authors Compilation

It can be observed from above Table, Sig. Value is < 0.05, F Value> FStatistic Value at 95% Confidence Level and 5% Standard Error Rate, Clearly Indication of Rejection of Null Hypothesis Considered for our study, Hence we accept alternate Hypothesis There is Impact of Trust and Security on Selection of Cashless Transactions .

CONCLUSION

While there is no denying the convenience of card or mobile wallet transactions, it could open a spending trap for an unsuspecting population. According to behavioral finance theorists, the pain of parting with money is felt more acutely if you use physical cash instead of a card. Hence, using cash instead of cards or mobile wallet acts as a natural bulwark for people who find it difficult to control their spending. This is the reason that people could end up overspending, throwing their budgets into disarray. Besides, a high penetration of the digital payment system is contingent on the fact that the same amount of cash does not come back into circulation. If it does, people are more likely to switch back to the former ease of using cash, as it is a habit that they may find difficult to break. We accepted alternate Hypothesis There is Impact of Trust and Security on Selection of Cashless Transactions.

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A UNIFIED STRATEGIC MODEL FOR ISOLATED SYSTEMS INTEGRATION

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ABSTRACT

Several isolated systems are designed for the enterprise's integrated automation. These systems not only support automation of salient processes in the enterprise but also resolve issues related to functional or nonfunctional requirements of the academic and non-academic problems. It is inevitable and enforces organizations to change with respects to time to align the changing needs of the organization without retiring the legacy of systems. Several isolated systems are usually developed for different needs at different times using different platforms and technologies.

The current state of isolated systems consists of several challenges like data & operations redundancy, multiple authentication & authorization, system heterogeneity & complexity. This challenge leads to wastage of time, cost and efforts. Institutions are facing such challenges to establish a balance between uses of existing legacy systems along with adapting new systems in future expansion. As a case, Arba Minch University (AMU) is also facing such challenges where the study is focused to collect primary data for study and analysis. This research study is an effort to develop a unified strategic integration model for isolated systems with new features like Single-Sign-On, centralized common database, integration and inter-operability.

The study deeply investigated and analyzed the opportunities and challenges in terms of integration for single sign on, centralized database control and integration and interoperability. Finally, a unified strategic integration model for isolated systems USIMIS is designed with RESTful API and Centralized database for the functional modules using two selected systems i.e. simulated E-learning over Moodle and simulated SMIS over OpenSIS for functional demonstration and validation. The new knowledge based system was evaluated by user test data for its significance need, relevance and efficiency.

KEYWORDS

Software, Isolated System, Integration Strategy, SOA, Integration Model etc.

INTRODUCTION

Isolated Enterprise Systems are systems that are separate on the design, platform, business and technology to facilitate information flow in the enterprise. Developing countries universities like Arba Minch University (AMU) who are in first generation augmentation state and having financial limitations have different systems designed and deployed in the web portal are used to manage resources and services.

The major categories are: 1) Academic / Learning Management Systems: These software systems whose main goal is to manage data on courses, subjects, teacher, students, research, and E-learning. 2) Administrative / Management Systems: Such systems whose main goal is to help manage personnel and / or planning and management, and financial management at the university like SMIS, Humana Resource Management System, Financial management systems and Warehouse and Inventory Management Systems. 3) Support Service Systems: are used to manage users and access control of the infrastructure. The enterprise system is one of the system integration approach in which all isolated systems exist in the enterprise is integrated for the common goal. Educational enterprise system is a concept or an information technology solution that automates all the academic and non-academic services / resources of the institute.

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Typical academic services may include registration, admission, recruitment, and students' records. Non-academic or administrative functions include accounting, payroll, human resource, billing etc. (1). Today as a matter of facts, adaptation of enterprise systems is the biggest challenge (1). This is because; the adaptation enterprise systems should not affect the preexisting system's operations and business rule of the organization. The challenges arise when an educational enterprise's software systems need integration. The advantages are, no doubt, numerous like starting from the reduction in the costs of maintenance of several information systems upto simplification of workflows (2). For instance, if organization has several software developed for different process automations; and the software are running very well but gradually creates challenges like redundancy of data, duplication of efforts, multiple authentication and authorization on salient gateways. In case of universities of developing countries having procured ICT or software systems in phased manners in general and AMU in specific case under investigation this study; the researcher observed that universities have several well-developed, well-tested and implemented systems; and running successfully. Different organizations and developers using salient tools and technologies for different purposes developed these systems. As a technology trend, the existing systems consume lots of bandwidth on isolated system, which can be unified (3).

LITERATURE REVIEW

The two main approaches of system integration are adopted in this research study and that are enterprise system and the system integration. In the Enterprise system, systems are divided into traditional and web enterprise system, and the second system integration partitioned into 1) Enterprise Application Integration 2) component based software system 3) Standard interface and open system. System integration is a process whereby a cohesive system is created from components that were not specifically designed to work together. The term integration is the process of inter-connecting one system with another system in order to provide a useful exchange of information, data and/or control between the systems (4). Now-a-days organizations are using intranet platforms to integrate their isolated systems under single umbrella like project, management, control, and socialization of employees with single sign-on (5). For this research outcome case, we selected the second system integration approach to integrate E-learning with Simulated Student Information system. The main feature of isolated enterprise system are data redundancy and operations, multiple authentication and authorization, incompatibility, data integrity and system heterogeneity are the major issues of isolated enterprise systems.(6) Applications can use the single sign-on system to provide users with seamless access to content that is stored and managed in disparate systems without requiring the user to log on multiple times. The system includes an application-programming interface (API) for creating a single sign-on implementation and a service provider interface (SPI) for creating authentication plug-in modules that interface with existing authentication standards. The integration tool i.e. Web services integrate different middleware systems. Web service is used extensively and largely in distributed prototype system. Even in E-Governance web services, such systems have already introduced (7). The general schema for web service based software is publish, find and bind. Service-oriented data integration architecture has been proposed to provide a dynamically unified view of data on demand from various autonomous, heterogeneous and distributed data sources. Service providers publish their data sources as data access services, which may then be discovered, bound at the time they are needed and disengaged after use. Hence, the changes such as organization structures, backend data sources, data structures and semantics could be managed dynamically and potentially reduce the maintenance cost (8). Web service has three major protocols i.e. REST, SOAP and XML-RPC. REST web service protocol has been used to integrate for E-learning system and Open student Information Systems. Interoperability and integration is the challenging issue for isolated systems in the enterprise that are designed for different functionality and purpose with different technologies. (9)As interoperability is the capability of communication with peer systems and right to use functionality of isolated system. System integration may enable the decision makers to explore the full potential of decisions using data analytics (10). Integration enables sharing and exchanging of information to different isolated systems. The related work like Integration of Information and E-Learning Systems in Higher Education (11) focuses on CMSJoomla as the central portal to integrate other isolated systems (12). However, in our proposed study Moodle is the central portal to integrate simulated student information systems. The other work ENOSHA and Moodle: The Integration of two E-learning Systems (13) focuses on, Single Login for salient systems of enterprise was developed using eNOSHA system and Moodle system to speed up the flexibility and usability of inter system communication using XML-RPC protocol (14). The integration technology on the related XML-RPC is an old protocol related to our REST protocol, which is used in our proposed model. In related study, E-learning system also customized using old

Moodle 2.0 version, which is again challenge of limited plugins and features, but in this proposed study Moodle version 3.2.2, is used with extended features and plugins.

RESEARCH DESIGN AND METHODOLOGY

This research study is a constructive research because it develops a unified integration strategic model for isolated enterprise systems, which suggests a new knowledge about isolated system has to be integrated in unified ways. The research approach is also qualitative and quantitative approaches used to analyze the inputs from questionnaire.

The major primary data collection methods incorporated is: 1) Interview is conducted from domain experts called technocrats (ICT Directorate, System administrator team), and end users. The interview is purposely carried out to access isolated enterprise system needs integration and interoperability among each other. The researcher interviewed the technocrats with basic parameters of isolated systems. The basic parameters of isolated system considered in this research are multiple authentication, data redundancy and operation, system heterogeneity, system readiness assessment and data integrity. 2) Questionnaire: The set of questions were distributed and responded by respondents/stakeholders.

The questionnaire was mixed type questionnaire i.e. both open-ended and close-ended questions. This research study prepared online survey structured questionnaire using Google Forms. The structured Questionnaire sends to each respondents through their email. The respondents' response is stored on Google Spreadsheet and analyzed.

3) The document analysis data was collected from different sources such as software integration journals that provide concepts of software integration and unification, research papers, reports, E-books, white paper and literature review of reports.

4) Technical observation: is one the method of collecting research facts / data. Direct observation provides strong input for the research and lead to investigate how really the isolated system works in the enterprise. As the researcher personally observed the isolated systems that are not integrated and not interoperable.

5) Sample Size and Selection Strategy: The size of the sample is determined by the optimum number necessary to enable valid inferences to be made about the population. The sample size for this research study selected was forty (40) which depends on different conditions and criteria's set by researcher for selecting respondents for Open-ended interview and Online Survey. The sample size is purposive, because it was focused on the inputs of stakeholders and domain experts. The research study used selected tools and open source for data collection (cloud based Google forms), Data Analysis (SPSS), and Strategic Model simulation (Moodle & OpenSIS) and (web service) and tool integration method for integration. The two open source used in the research are: 1) E-learning system simulated over Moodle 2) Simulated SMIS over OpenSIS: new paradigm in student information management system. Both Web service and middleware is integration tool in servicer-oriented architecture. In our research study, we choose web service tool as the best integration tool relate to middleware technology using different parameters like platform dependence. Interoperability, reusability, heterogeneity and technology.

DATA ANALYSIS

The basic data analysis parameters used in this research study for unified integration strategy of the isolated systems, are 1) Single sign on, 2) centralization of access, 3) Interoperability, 4) Modular and Open Architecture 4) Service Oriented Architecture and Web services, 5) Data structure and Format , 6) Scalability, 7) Integration, and 8) Quality of Service.

Designing the Model, Validation and Evaluation

After detailed isolated enterprise system integration readiness assessment like 1) Integration readiness level metrics was used to measure the integration maturity between two or more components. In the selected isolated systems at AMU, Moodle was selected because of 1) open source nature and 2) built-in web service tool for integration with other systems. Therefore, Moodle is ready for integration purpose. The researcher observed with a technocratic view

that the systems like SMIS is not ready for integration purpose. 2) System Readiness Metrics is an innovative mechanism that provides a system level metrics to help reduce integration issues and leading causes of system development failures. Implementation of the System readiness assessment mechanism aids decision makers in identifying both programmatic and technical risk areas (15).

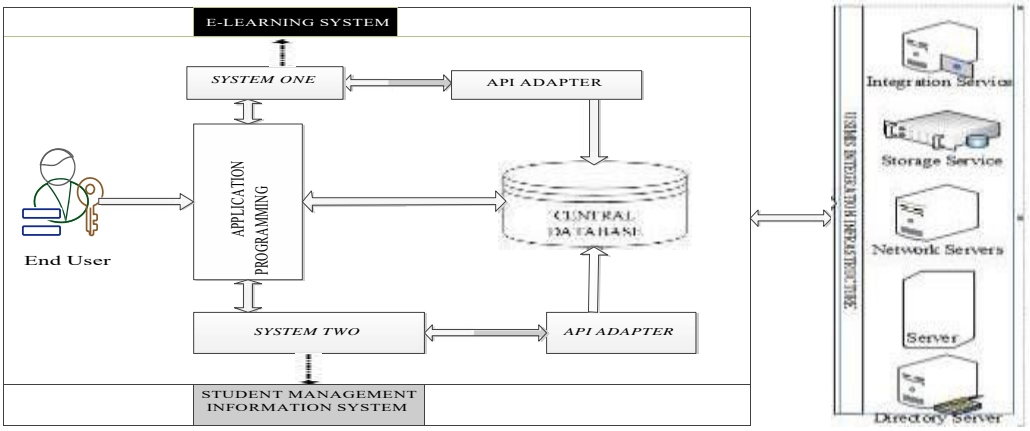
E-learning systems can be used in different environments such as in education, training and development, and business settings. Educational institutions use Moodle as a tool for creating online web sites for their students to conduct fully online courses. To build collaborative communities of learning, it includes many activities such as forums, databases, and wikis. It can be used as a way to deliver content to students and conduct continuous assessment through assignments and quizzes. Moodle considers the following main roles in its architecture (16).

The main actors of the E-learning system are: 1) Administrator: Can do anything in the system and in any course. 2) Course Designer: Can create courses, teach them, and assign other to teachers' roles. 3) Non-Editing Teacher – Can teach a course and evaluate students but is not allowed to change their activities. It can be represented as an assistant teacher or a part-time teacher. 4) Student – Can participate in activities created by teachers inside a course, either individually or in groups (when applicable), but cannot change them.

The student information system is customized from OpenSIS; an open source system to simulate the real SMIS exists in the Enterprise. The major actors of the system are Student, Parent, Administrator and Teacher. OpenSIS is web-based, open source, and comes packed with features that include student demographic info, scheduling, grade book, attendance, report cards, eligibility, transcripts, parent portal, student portal and more (Placeholder4). The selection of suitable integration strategy tool for system can make the systems to be integrated.

The major integration tool used is: 1) Data Integration: Is integration strategy, which uses the import /export feature of both systems and relies on the support common data format. 2) Application Programming Interface (API) Integration: This integration strategy allows users to benefit functions and web service API documentation directly from E-learning system. 3) The Tool Integration: Learning tool interoperability (LTI) is used to allow remote tool and content to integrate into Moodle LMS. The main usage of LTI is to build links between learning tool and LMS i.e. Moodle. The type of integration strategy is the most suitable for educational institution like Arba Minch University to integrate isolated systems in low cost and increase the suitability for the teaching and learning environment between instructor and students.

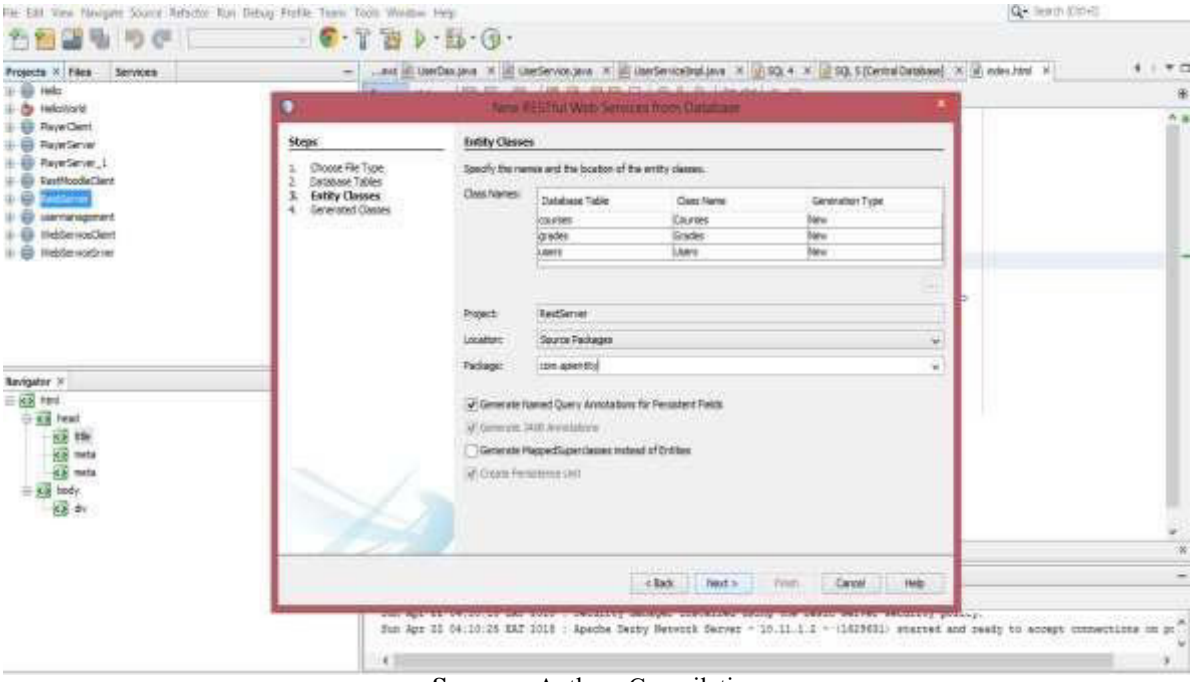
Figure-1: A Unified Strategic Integration model for Isolated Systems (Simulated Moodle and SMIS)



Sources: Authors Compilation

In order to mitigate data redundancy for the two isolated enterprise system i.e. E-learning System and Student Management information system, the common centralized database has been designed to store the commonly used database.

Figure-2: Designing Centralized Database for Functional Modules



Sources: Authors Compilation

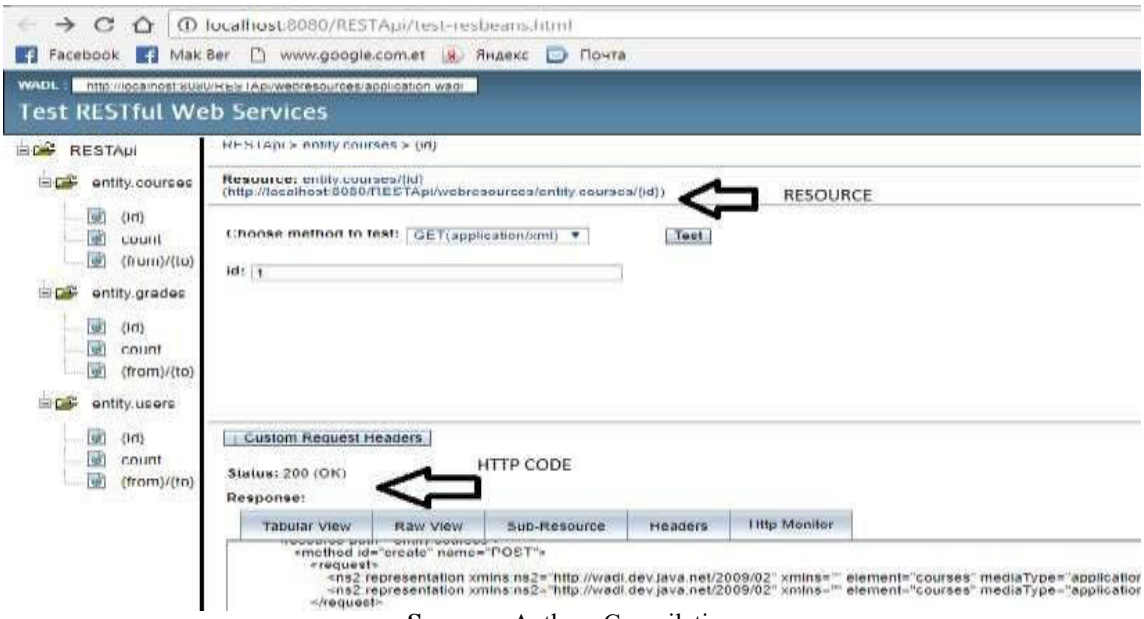
In the Simulated SMIS, the RESTful API interface is designed to single sign on from SMIS to directly to the API, which the common module. Without re authenticating the Simulated SMIS, the single sign on action is performed.

Figure-3: RESTful API over Simulated SMIS

Sources: Authors Compilation

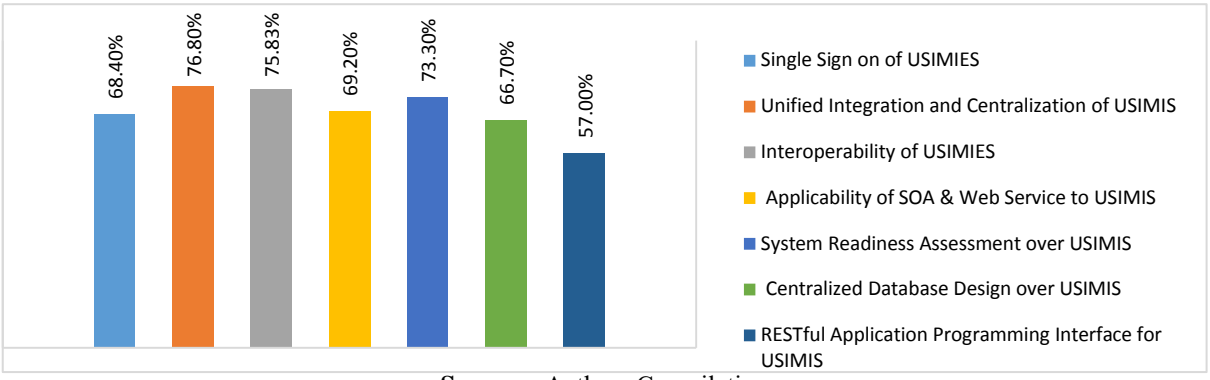
Interoperability aims to overcome the inconsistency between diverse systems of isolation in the enterprise like AMU. The interoperability feature of RESTful API used to reduce duplication of efforts and database.

Figure-4: Test Result of RESTAPI



Sources: Authors Compilation

Figure-5: Summary of Evaluation Results of USIMIS



Sources: Authors Compilation

Table-1: Comparative Analysis between Proposed Model (USIMIS) and Existing System Integration Models

S. No.	Parameter	ERP System	Enterprise Application Integration	USIMIS
1	Designing Centralized Database	In ERP System, common single centralized database is sandwiched to store data of all systems.	In this model, software systems' architecture style and legacy systems were integrated in the Enterprise using ESB.	Common Centralized Database designed for the model as general and specifically for the selected modules, the Centralized Database is implemented.
2	API	The System of ERP divided into front ended and back ended systems. The integration takes out in the data access layer.	Use Messaging Bus (Centralized Engine) to exchange the data.	The RESTful API is used which is as a between to the isolated systems and fetches the data from the centralized database.
3	Single Sign On	Use One Login.	Link business process.	API supports to single sign on in the proposed model.

4	Inter-operability	ERP system both technological level and business level interoperable because the SOA and web service.	Since the Current EAI uses ESB, it is interoperable with not only with on premises system but also with third part systems.	Web service is cross boundary interoperable tool, which is used to make the isolated systems interoperable.
5	Integration Technology	The early ERP System uses Point to point integration method. Due to limitation of P2P, ERP system started to use integration adapter and ESB technology in the current situations.	(RMI, RPC, CORBA, and DCOM): this is traditional integration tools. This model use web service for better integration. Uses XML based Middleware.	Web services are used to integrate the isolated systems in proposed model. Web service (XML-RPC, SOAP and REST) the major protocols.
6	Scalability	ERP system supports scalability of different modules.	Since ESB is scalable and distributable, the modern EAI supports.	The new model uses Web service API that is scalable and common centralized Database, which can proposes a replica server in future.
7	Flexibility	ERP modules can be detached and integrated without affecting the existing modules.	Since ESB is easy to expand, EAI supports the flexibility.	Since RESTful API is designed from web service, and Supports both flexibility in modification and functionality.
8	Portability	In the current state of art, ERP uses the middleware and web service, which include portability.	The modern EAI is easily portable because it uses SOA, ESB, XML based Middleware.	Since web, services are the technologies, which are platform independent and can integrate different systems developed in isolated environments.
9	Security	Centralized security policies are applied to secure the systems.	It is easy to implement security over ESB.	The authenticated users only have right to access the proposed unified model based system when deployed.
10	Reusability	The modem ERP system supports Reusability because it uses the current integration technologies.	ESB which the combination b/n ESB and traditional middleware supports reusability.	SOA fully supports the reusability function and service.

Sources: Authors Compilation

CONCLUSION

This research study mainly focused on the integration of isolated systems in general and academic institutions like Arba Minch University (AMU) as a case of an educational institution. At the outset, two systems were selected for case based observation, analysis, design, development and deployment using salient platforms and technologies. The prime aim of this research was to observe, analyze and resolve the issues and challenges in terms of Unified Strategic Integration Model for Isolated Enterprise Systems to facilitate Inter-operability, Single Sign On and Centralized database Control. During the fact-findings through survey and observation, it was found that the features like future integration and interoperability with common centralized database control was ignored, as it was not the prime aim of the enterprise to develop and implement the aforementioned systems. These ignored issues are considered as the main thrust of this research study to design a unified strategic integration model for single sign on, centralized database usage and control with inter-operability. As case, AMU's systems like SMIS and E-Learning do not provide interoperability, single sign on and common database usage and control in teaching-learning, examining and grade submitting processes.

To make the research study significantly worth conducting and relevant, the researcher gathered and analyzed the facts collected using online survey questionnaire from students, academic staff and technocrats, interview of ICT officials and senior technocrats with technical observation of the selected isolated systems at the sites. The responses and their analysis with respect to aforementioned issues and challenges clearly reveals that the integration of selected isolated systems is worth doing and significantly important. In addition, it is important to ensure effective utilization of legacy systems in future for aligning the newly introduced systems to avoid undesired retirement of the legacy

systems. As a design science contribution in this research study, a unified integration model "*Moodle-OpenSIS USIMIS"* was designed. To validate the model, the Simulated E-learning System and the simulated SMIS were used. These two systems were designed, developed and integrated using Moodle for simulated E-learning System and OpenSIS for simulated SMIS. In order to functionally integrate and demonstrate the two systems, REST Web service was used to implement the RESTful API in this study.

In order to test the model i.e. *Moodle-OpenSIS USIMIS;* a functional demonstration and user evaluation for validation was successfully done using these two systems. In this process, these systems were customized for system integration. This new knowledge based model for 'unified system integration, single sign on and inter-operability with common database use and control' reveals that all other isolated systems or software components of any academic enterprise in general or AMU enterprise as specific, can be integrated without affecting system business rules and functions in cost effective manner. This new knowledge can preserve the legacy of systems on which many resources have been consumed. This will avoid unnecessary and illogical retirement of those legacy systems, which are working with well-tested efficiency and avoid costly retirement of these legacy systems. As a case base study and analysis, the AMU's isolated system integration readiness assessment was also carried out during technical observation. During technical observation and related document analysis; it was found that the isolated systems are being served and controlled via different servers with multiple authentication and authorization which is required to be reviewed, reorganized and restructured for smarter adaption of new technologies without forcefully retiring those systems which are working without any significant deficiency.

RECOMMENDATION

This research tried to achieve the objectives of the study but following activities are considered as recommendation for extension of this research or further studies: During fact-finding technique the researcher observed and investigated the AMU's Isolated Systems only then designed and implemented to solve the specific problems that exists in AMU only. This can be more generalized and extended for all types of institutions.

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ASSESSMENT OF INSTITUTIONAL REPOSITORY INITIATIVES AND DEVELOPING A LOCALIZED KNOWLEDGE REPOSITORY FRAMEWORK FOR ETHIOPIAN HIGHER EDUCATIONAL INSTITUTIONS

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ABSTRACT

This study's interest is to assess the present status of Institutional Repository (IR) in Ethiopian Higher education institutions for its Existence, Usage, Policy issue, Content variety, Availability, and Software Type of digital repository collections available to academic community and industries as open access. For this purpose, selected Ethiopian higher education institutions have been consulted to assess their digital strategies through wide- ranging data collection approaches. Subsequently the paper focuses to design and develop a cloud based Knowledge Repository System's Framework for institutional repositories in Ethiopian context. Results showcased few operational institutional repositories, which were in place at some institutions, but the majorities were not experiencing such a system. The study contributes to a more informed understanding of the development of IRs and identifies a framework for better availability of existing institutional repositories and for future IR developments. For the functionality and validity assurance, the prototype has also designed and tested in real world scenario for virtualized cloud environment and found practical and useable.

KEYWORDS

Institutional Repository, Higher Education, Framework, Availability, Open Access, Open Source etc.

INTRODUCTION

The advent of internet and the World Wide Web has changed the way of information dissemination in many ways. The scenario in academic institutions is not far from this truth. These institutions are the main sources of knowledge and excellence and have remarkable contribution in societal development.

The Institutional Repository (IR) is an information system that collects, preserves, disseminates and provides access to the intellectual and academic output of the university community (HEFCE, 2009). An institutional repository can also be viewed as a "...a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members. This includes materials such as monographs, academic journal articles, both preprints and post prints undergoing peer review, as well as electronic theses and dissertations (ETDs) (Ithaka, 2006).

Nowadays, the IR is a key tool of the scientific and academic policy of the university. On the other hand, access to the full text of the digit13al learning objects makes the repository become a fundamental support tool for teaching and research, whilst at the same time multiplying the institution's visibility in the international community (Werner Z et. al. 1999).

A repository contains mechanisms to import, identify, store, preserve, recover and export a set of digital objects, usually from a web portal (Buehler and Boateng, 2008). Labels ('metadata') that facilitate their recovery describe those objects. From a conceptual point of view, the IR forms an authentic management system of contents, given that, apart from the documents themselves, the repository offers to the academic community a set of services for the management of that output (ANBL, 2007). The IR is a means of scientific communication, but it cannot be understood

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as a publication channel; it must be understood as a complement to the process of scientific publication formalized with peer review (BIS, 2009).

In the last few years, the increased acceptance of Open Access (OA) movement has gained a lot of strength among the academic and scientific institutions and this leads to the spread of institutional repositories. The OA supports the paradigm of the open access and the self-archiving of the publications.

Budapest Open Access Initiative (BOAI) defines open access as: "Free availability on the public internet, permitting any users to read, download, copy, distribute and/or print, with the possibility to search or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself".

PROBLEM STATEMENT

Over the last two decades, higher education institutions (HEI) in Ethiopia are expanding drastically; same time they are facing a number of challenges. In recent years, considerable interest has focused on identifying those challenges, identifying opportunities and threats and proposing ways to address them. Limited visibility of the scholarly contributions of the institutions to the different domains of sciences and industries are identified as one of the challenges by many researches. In addition lack of funding, collaborating in research and talent, quality of research, critical thinking and argumentation, personal and group knowledge construction are identified as challenges facing higher education institutions.

Institutional Repositories can provide linking to other repositories and can support HE institutions to address some of the challenges.

This research is planned to be conducted to address those challenges by assessing the status of the institutional repositories in Ethiopian Higher education institutions and to design a framework, which is interoperable and can be deployed in all Ethiopian Higher education and research institutions with minimal or no modification. Therefore, the research tries to get answers for the following research questions extracted from the problem statement.

Is an institutional repository system deployed in Ethiopian Higher Education Institutions?
If IR is already deployed, how is the usage and service availability of the systems?
How is the content variety? What kind of software platform is used?
Does the repository offer Open Access information? Is there an Open Access policy?

LITERATURE REVIEW

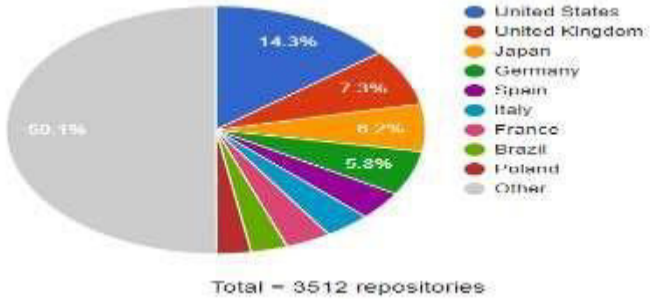
In the past two decades, institutional repositories (IRs) have become a common part of the scholarly communication ecosystem (Farhana S., et. al. 2010). As presented on Fig 3.1 the fast growth of institutional repositories is initiated from the year 2006, before this year there were only less than 500 repositories worldwide. As many research results are demonstrated; the development of institutional repositories has fasten the academic institutions linkage with the industries and the visibility of the institutions scholarly outputs has created collaboration among other institutions. As an increasing amount of government funding is now directed to open access publishing, this may foster the development of institutional repositories worldwide even more.

The Directory of Open Access Repositories (OpenDOAR) currently (March 2018) reports 3,512 institutional repositories worldwide of which 502 (14.3%) are in the US, 256 (7.3%) in the UK, 217 (6.2%) in Japan and 203 (5.8%) in Germany. The figure below presents the proportion of repositories worldwide as of March 01, 2018.

Figure-1: The Growth of OpenDOAR Database Worldwide over the years 2006–2017 (OpenDOAR March 2018)

Sources: Authors Compilation

Figure-2: Proportion of Institutional Repositories by Country - Worldwide (OpenDOAR 01 March 2018)



Sources: Authors Compilation

Several surveys of librarians in many countries' higher education institutions have been conducted in order to gain a better picture of the overall state of IR development; however, the vast majority of these surveys have focused on large comprehensive research universities and other large research organizations. A few authors have conducted similar surveys that were more inclusive. A recent, more broadly based survey from (DIUS, 2008) confirms other study is finding that large research universities are advanced in the development of their IRs but are not representative of the majority of colleges and universities. (Alma Swan et. al. 2009) Describe the impact of establishing and operating an IR on the roles and careers of reference librarians.

After analyzing the existing literatures related to the study in hand we have observed that no or minimum researches has conducted to examine the overall state of IR development in Ethiopian Higher education institutions and this research outcome would be a new contribution to the domain in Ethiopian context.

MATERIALS AND METHODS

Research Design

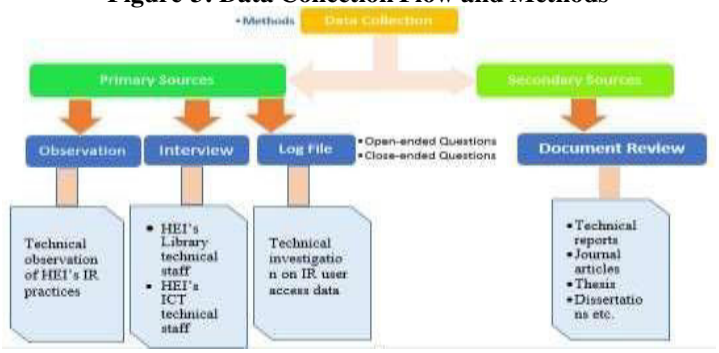
The study is mixed mode / form of exploratory cum constructive research designs (Deepshikha and Sharma, 2014). Initially the research starts with efforts to explore the institutional repositories in Ethiopian Higher Education institutions. It explores the answer for the research questions, Later the research study made an effort to construct a Knowledge Repository Framework as a prototype that can be used as a preservation center for existing and future

research works done at all Ethiopian Higher education and research institutions. Finally, the conceptual framework model has been implemented and deployed in a working infrastructure for the functionality and usability assurance. The whole scenario justifies that this study is exploratory cum constructive.

Research Approach

The Study used different approaches / methods for gathering relevant facts/ data and technical information in the domain of research. Figure-3 presents the major data gathering approaches used in this study. Based on chosen research design and required data the research approach used in this study was qualitative for technical interview of stakeholders / experts, system log file analysis and Personal technical observation of researchers. As a general concept, qualitative research is considered suitable for gaining an in-depth understanding of underlying reasons and motivations.

Figure-3: Data Collection Flow and Methods



Sources: Authors Compilation

DESCRIPTIONS FOR DATA COLLECTION PROCEDURES

Interview

Different HEI's Library and ICT experts are interviewed using open-ended and close-ended questions for better understanding of the status of Institutional Repository initiatives, System models, software platforms, content size, open access policy issues etc.

Sampling Size and Selection Strategies

The sampling method of the population in this research was Purposive sampling that includes directors and technical staffs of Library and ICT directorates at different Higher Education Institutions in Ethiopia. Thirty (30) domain experts (Directors of Library and ICT and Technical staffs) from Fourteen (14) public HEIs were interviewed using purposive sampling technique.

Technical Observation

Direct observation methods for collecting data regarding current status of IRs in the fourteen HEIs were applied to understand IR's deployment status, Models, Software platform, Performance, Interoperability, access methods, content and developmental framework. Later these observatory facts were critically analyzed.

Log Files

A log file is a system file, which provides evidence about user access information based on time and data type. In this research in addition to interview and technical observation, log file information is used to analyze the accessibility of IRs in selected Ethiopian HEIs.

Selection Strategies for Testing Tools and Technologies

Different software and designing tools and techniques were used to accomplish the research tasks. Open source DSpace digital repository platform is used to testing and functionality assurance of the proposed cloud based knowledge repository framework.

RESULT AND DISCUSSION

The study investigated the development and initiatives of institutional repositories in Ethiopian Higher Education Institutions. Keeping this in view, it was decided to structure the interview questions so that it helps us to address the research questions (Sharma and Alazar, 2016). The questions were designed to be in five major sections such as Demographic Information, Institutional Repository Assessment, Availability and Accessibility of Research Outputs, Institutional Policies and Conclusion. In addition, all the data collection procedures are structured to address the following parameters, which are aligned with the objectives of the study.

Existence,
Usage,
Policy issue,
Content variety,
Availability, and
Software Type

In the following sub section the analysis and discussion is presented according to the parameters. Total 14 institutions were identified for the study. Interview questions were presented in person for Library Directors, Library ICT staffs and ICT technical staffs of the 14 institutions. Responses were received from Library Directors / Staffs of 14 institutions, which is 100.00% of the total sample.

Existence of IR in the Institutions

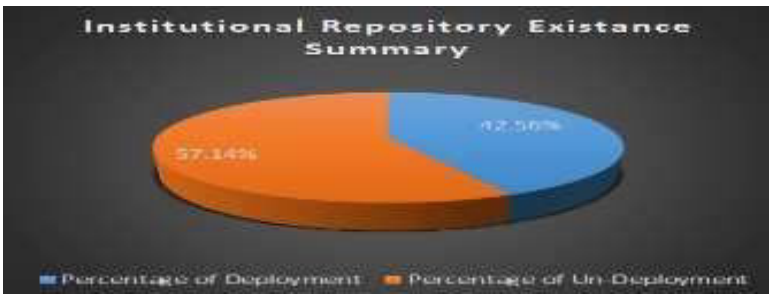
Table 1 presents the IR existence assessment in the 14 higher education institutions. The result showcases only 6 institutions (42.86%) are deployed IRs and the remaining 8 institutions (57.14%) does not deployed IR.; from this 57.14% , 35.71% of the institutions (5) are planning to deploy institutional repositories in the near future. Figure 4 shows the Summary of IR Existence in the institutions.

Table-1: Institutional Repository Existence in the Study Population

S. No.	Name of the Institution Repository	Deployment of IR Done?	Remark
1	Debre Markos University	Yes	Mixed With Digital Library
2	Bahir Dar University	Yes	
3	Woldia University	No	
4	Wollo University	No	
5	Debre Birhan University	No	
6	Addis Ababa University	Yes	
7	Jimma University	Yes	
8	Wolkitie University	No	
9	Ethiopian Institute of Textile Technology	No	
10	Haromaya University	Yes	
11	Arba Minch University	Yes	
12	Gondar University	No	
13	Wachamo University	No	
14	Wolayta Sodo University	No	

Sources: Authors Compilation

Figure-4: Summary of IR Existence in the Institutions



Sources: Authors Compilation

Usage of IR System of the Institutions

From the list of the institutions who already deployed Institutional Repository systems most of the usage statistics shows that the access is made from local machines, which are members of the local network infrastructure. In fact To disseminate its research output to the wider audiences and to maximize the outputs of research for the benefits of the community; the research outputs needs to be accessible to the global community including similar Educational Institutions, Industries, Funding agencies and etc...

IR Policy Issues in the Institutions

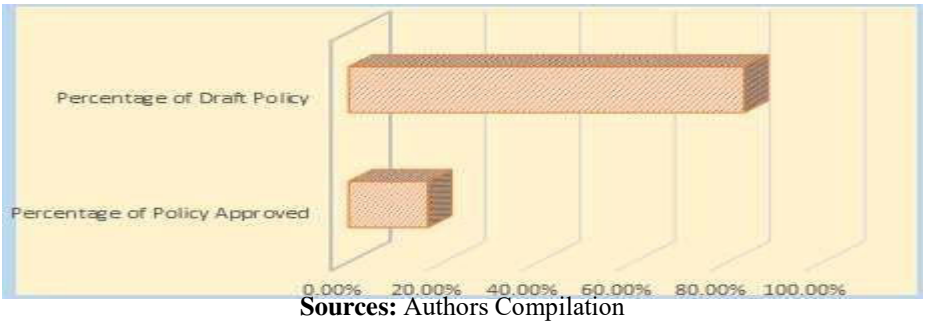
Accordingly, from the discussion and observations made the main barrier for the limited usage statistics is the result of Open access policy of the repositories. From the total number of IRs deployed in the sample institutions only 1 institution has an approved open access policy, which grants all public funded research outputs to be disseminated as broadly as possible to the global audiences. The rest 4 institutions are working on the draft policy preparation. Table-2 and Figure-5 present the summary of IR policy implementation and draft policy formulation activities in the sample institutions.

Table-2: Open Access Policy in the Institutions

S. No.	Institution's Name	Approved IR Open Access Policy	Draft IR Open Access Policy
1	Debre Markos University	No	No
2	Bahir Dar University	No	Yes
3	Addis Ababa University	No	Yes
4	Jimma University	No	Yes
5	Haromaya University	No	Yes
6	Arba Minch University	Yes	Yes

Sources: Authors Compilation

Figure-5: Summary of IR Policy Implementation and Draft Formulation in the Sample Institutions



Sources: Authors Compilation

Content Variety of IRs in the Institutions

Table-3 indicates distribution types of contents listed in the institutional repositories in Ethiopian Higher Education Institutions. Among the 6 sample institutions which are already deployed IR, 4(66.67%) repositories for Articles; Conference Paper; Theses; Dissertations and 2(33.33%) repositories for only Articles; Conference Paper; Theses; Books; Learning Materials.

Table-3: Distribution of Contents in IRs in EHEIs

S. No.	Content	Number of IR	Cumulative Percent
1	Articles; Conference Paper; Theses; Dissertations	4	66.67%
2	Articles; Conference Paper; Theses; Books; Learning Materials	2	33.33%

Sources: Authors Compilation

Service Availability of IRs in the Institutions

In online settings – such as IRs - there may be comparable impediments limiting the availability of items that are present (and, thus, available) in a collection, that is because the mere presence of papers within an IR does not guarantee their availability. The service availability mainly depends on the ICT infrastructure of the institutions i.e. the network bandwidth, server capacity, power backup systems and the software licensing issues. Among the 6 institutions 83.33% responded that they have stable ICT infrastructure; thus the service availability in the institutions is granted with acceptable downtimes. 16.67% of the institutions responded that they have barriers on their running ICT infrastructure; thus more down time problem facing.

Software Platforms Used By the Institutions

Table-4 indicates the list of software used by the institutional repositories in Ethiopian higher education institutions. Among the 6 repositories, 16.67% repositories are using AgriOceanDSpace software, and 83.33% are using DSpace. Actually, AgriOceanDSpace is an Institutional Repository software platform specifically designed for agricultural research repository development. Thus, we can conclude that all institutional Repositories in Ethiopian higher education institutions are using DSpace software platform families.

Table-4: Distribution of Software Platforms by IRs in EHEIs

S. No.	Software Platform	Number of IR	Cumulative Percent
1	DSpace	5	83.33%
2	AgriOcean DSpace	1	16.67%

Sources: Authors Compilation

Proposed IR Framework

The study proposed a cloud based institutional Repository framework which can serve the entire Higher education institutions (Public and Private) in Ethiopia without a major change on the existing institutional repositories which only needs some configuration for integration with the national cloud based IR (Alemseged and Sharma, 2016). Hence, Cloud computing is a new paradigm that provides a wonderful advantage in terms of latest technological support, economic aspects (i.e. pay as you use), bendable computing competences, real time availability, reliability of services with limitless computing power and many.

The proposed cloud based institutional Repository framework for Higher Education Institutions contains three tires.

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Local / on Premise Infrastructure Layer

This layer comprises IR servers distributed at different higher education institutions, which provides services like security and monitoring, standardization and interoperability and storage.

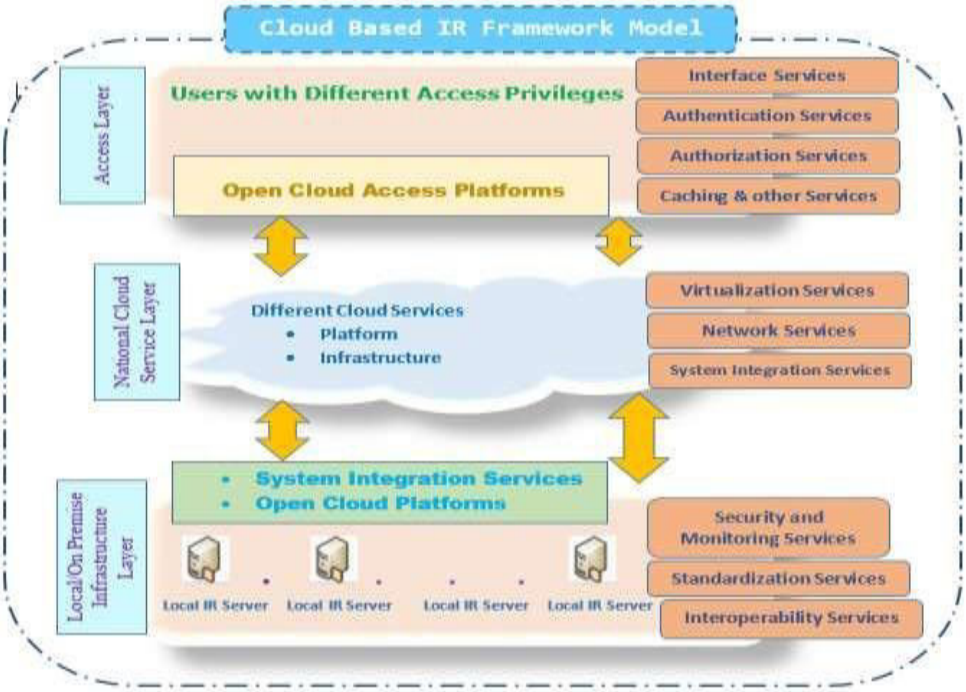
National Cloud Service Layer

This layer performs the task of integrating on premise ICT infrastructure to the access layer so that the services seem to be rendered from a single service center.

Access Layer

This layer performs user access operations (i.e. Authentication, Interface service, catching), different cloud controllers can be used for this layer to manage such services e.g. Eucalyptus open source cloud.

Figure-6: Layered Cloud based IR Framework, which is proposed by the Study



Sources: Authors Compilation

CONCLUSION

Institutional Repositories have a vital role for the development of institutions, community and industries, in that removing the barriers related to the IR initiatives will accelerate research and development works, enrich education, and share learning. The main barriers identified in this research related to IR initiatives are: 1) small number of institutions deployed IR system; 2) limited implementation of open access policy in the institutions, 3) ICT infrastructure Limitations especially in the new generation institutions and 4) collaboration among ICT department and the Libraries is minimal in many institutions. It is good effort for accessing all the IRs in one place all over the world, thus this research proposed a cloud based IR framework which can be deployed by all HEIs with no or minimal modifications. For the functionality and usability assurance, the framework is tasted at Arba Minch University ICT infrastructure as a case and a virtual cloud infrastructure found functional and usable.

RECOMMENDATION

Because of the huge positive impact of Institutional Repositories (for the institutions, community and industries), we recommend: First; all HEIs in the country to start working on IR deployment, with minimized barriers by taking lesson from their predecessors. Second; ICT and Library departments to work collaboratively. Finally; the institutions higher bodies should support Open access policy formulation. Further, the proposed framework should be deployed in a working environment and other enhancements will be expected from future research works.

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