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Title: USING INTERNET OF THINGS IN ACADEMIC UNIVERSITIES BASED ON IRANIAN LIBRARIANS VIEWS

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APPLICATION OF INTERNET OF THINGS IN ACADEMIC UNIVERSITIES BASED ON IRANIAN LIBRARIANS

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Abstract

Current research attempts to investigate the views of librarians of Iranian academic central libraries on the use of (IOT) in Iranian academic libraries. The present study employed in a descriptive and survey method. The statistical population of the study was 298   librarians of the central libraries in the top universities of Iran including Isfahan, Amir Kabir, Tehran, Tarbiat Modares, Shahid Beheshti, Tabriz, Ferdowsi, Shiraz, Khaje Nasir al-Din Tousi, Sharif, Elm-o- San'at (Science and Industry) .Sampling was done by simple random sampling. The Cochran formula was used to determine the sample size. Considering the 95% confidence level and after the numerical values were placed in the corresponding formula $[n = (Za / 2 \times \sigma) / \varepsilon]^2$, the sample size was obtained as 168. The data gathering tool was a researcher-made questionnaire. Among the questionnaires distributed by email, 113 questionnaires were collected. Validity of the questionnaire was measured by a number of Library and Information Science experts. To assess the reliability of the questionnaire, the Cronbach's alpha coefficient was used. The reliability of all components of the questionnaire was greater than 0.70. Data analysis was performed using the SPSS version 20 software and statistical indictors like frequency and mean. The Internet of Things, according to the tools provided by the libraries, is able to increase the speed of provision of services and perform the activities related to such services (for example, book exhibitions, meetings, etc.) with more ease .Libraries are always exposed to damages such as fire and accidents due to the old infrastructure. In addition, libraries face specific damages alongside their functions, which must be managed in order to minimize them. Theft of resources that is sometimes irrelevant in some libraries is one of the damages that libraries face and need to tackle it. In both cases, unplanned incidents and robbery, the use of IOT technology can be very useful. Of course, if the library building is located on the columns and the sections can be easily separated, you can provide more space without having to

spend much time and manpower through the use of sensors installed on the equipment for libraries that lack space. Research findings revealed that Iranian librarians pointed to the benefits of IOT in retrieving accurate information related to the needs of users without applying experience-based practices. They also point to the ability of the IOT to record the users' interests in doing personal activities and sharing knowledge and skills with other users.

Introduction

Academic libraries are among the most important centers for providing internship services, which are, generally, in relation to clients and provide reference services for the development of scientific foundations of the university to the users. Attracting clients through in meeting their needs quickly and ease of use of academic libraries are important issues to be addressed in this regard. Many of the world's major libraries are using libraries with new technologies to satisfy users and empower their employees to meet the needs of their clients.

The Internet of Things (IOT) describes a situation in which a large number of devices (objects) are connected by sensors over the Internet. The Internet has an industrial root that means connecting machines to one another, but it is now also expanding in the realm of business due to low-cost sensors (Chang, 2016). Given the value of knowledge in economic growth, attention to libraries as a resource center for access to information is increasingly highlighted. Hence, through computer technology and the Internet, traditional libraries are on the verge of transformation, and smart libraries will emerge in the process of developing current and future libraries (Xu, 2014).

Libraries can provide a variety of services through the use of this technology because of the focus on providing services to meet the clients' information needs and availability of information. Current research attempts to investigate the views of librarians of Iranian academic central libraries on the use of (IOT) in Iranian academic libraries.

Research Objectives

1. Identification of effective factors in designing the model of using (IOT) for implementation in academic libraries

2. Identifying effective factors in relation to clients in the use of (IOT)

3. Identification of IOT's capabilities in improving services in Iranian academic libraries

4. Identifying the connection of IOT and intelligence in Iranian academic libraries

5. Providing a suitable model for the use of IOT in Iranian academic libraries

3. Research Questions

1.   What are the factors influencing the design of the model of using Internet of Things for implementation in academic libraries from the view point of Iranian librarians?
2.   What are the factors influencing the use of IOT in the view of Iranian academic Librarians??
3.   What are the capabilities of IOT to improve the services of academic libraries in the viewpoint librarians?
4.   What is the proper pattern for using IOT in academic libraries?

4. Literature review

Many researches have focused on the use of modern technology and IOT in libraries , including Wang and Zhang (2012), Camarina Matus, Tomic and Gera (2013), McKinney, Cassimally (2014), Singh and Sharma (2015), Boras and Associates (2016), and Raj, and Raman (2017). Li (2013) in a research entitled "Designing and implementation of university library automatic management system based on IOT " explained that IOT can work in a variety of activities, including the process of returning resources in the lending department, intelligent inventory, intelligent query, and combining books and information systems. Du & Liu (2017) concluded that the technology of IOT would cause profound changes in the library and would lead to the advancement of libraries. Hoy (2015) highlighted the benefits of using IOT for libraries, and the problems of this technology in terms of privacy and security. Alwadi, Kilby, & Gawanmeh (2017) found that RFID technology can lead to improvements in operations and automation of library processes. Fernandez (2015) stated that by better understanding of IOT, librarians can therefore be better positioned to respond to developments as they emerge. Liang and Chen (2018) provided a prospective for the application of IOT in libraries; the technologies related to IOT have the potential in betterment of library services. Nisha, Karande, Desai, & Pereira (2017) stated that access to books increases using IOT technology and placing books on the shelves with greater accuracy. Review of the related literature shows that many studies such as Doo Liu (2014), Hui (2015), Pujar and Satyanarayana (2015), Masseys (2016), Wójcik (2016), Nag and Nikam (2016) have focused on using IOT in libraries so far.

Research Method

The present study employed in a descriptive and survey method. The statistical population of the study was 298 librarians of the central libraries in the top universities of Iran including Isfahan, Amir Kabir, Tehran, Tarbiat Modares, Shahid Beheshti, Tabriz, Ferdowsi, Shiraz, Khaje Nasir al-Din Tousi, Sharif, Elm-o- San'at (Science and Industry).. Sampling was done by simple random sampling. The Cochran formula was used to determine the sample size. Considering the 95% confidence level and after the numerical values were placed in the corresponding formula [$n = (Za / 2 \times \sigma) / \varepsilon$] $^ 2$, the sample size was obtained as 168.. The data gathering tool was a researcher-made questionnaire. Among the questionnaires distributed by email, 113 questionnaires were collected. Validity of the questionnaire was measured by a number of Library and Information Science experts. To assess the reliability of the questionnaire, the Cronbach's alpha coefficient was used. The reliability of all components of the questionnaire was greater than 0.70. Therefore, the research tool had an acceptable reliability. Data analysis was performed using the SPSS version 20 software and statistical indictors like frequency and mean.

Findings

1. What are the factors influencing the design of the model of using Internet of Things for implementation in academic libraries from the view point of Iranian librarians?

The purpose of this question was to identify influential factors in the design of IOT model for implementation in academic libraries from the view point of librarians. In order to achieve this goal, the questionnaire was developed for 10 closed questions (with a Likert spectrum) and on open question. The results are shown in Table 1.

Table 1: Descriptive indicators related to effective factors in designing a model for the Internet of Things

Factors	Average
Lack of clear understanding of the technology of the Internet of Things	4.25
Lack of familiarity the Internet of Things with in IT managers	4.38
Librarians unfamiliarity with the technologies of the Internet of Things	3.99
The lack of funding for the Internet of Things technologies	4.39
Negative attitude of managers in taking advantage of new technologies	4.42
Uncertainty about the effectiveness of the Internet of Things in the provision of services	4.23
Lack of policy and strategic plan	4.28
Lack of certainty, in creating new opportunities to deliver better services	4.35
Fear of exposure to new technologies	4.34

According to Table 1, the managers' negative attitude toward using the new technologies is 4.42 from the view point of librarians.

Some of the influential factors mentioned by the librarian included lack of a clear understanding of IOT with a mean of 4.24, lack of familiarity with IOT with a mean of 4.38, lack of financial credit for providing IOT with a mean of 4.39, uncertainty in the efficiency of IOT in the provision of services with the mean of 4.42, lack of policy formulation and a 4.24 strategic plan with a mean of .24, and doubts about creating new opportunities for better services, mean 4.42. Fear of facing new technologies had the highest impact with the mean of 4.42. The librarians' unfamiliarity with IOT with an average of 3.99 had the least impact.

Table 2: Factors affecting customers in the use of the Internet of Things

Factors	Average
Attracting more clients to the library.	4.03
Using a variety of library services	4.12
Accelerating the process using library services	4.03
Helping the clients plan with better time management to use library services	4.17
Makes it easy to locate information resources in the library	4.15
Easy access of users to library services and users would be better	4.27
Getting more and classified requests from clients classified bring	4.10
Increased responsiveness to clients	4.27

Data for the Internet of Things makes it easier to identify the tastes of clients	4.03

According to Table 2, easy access to library services and an increased response rate to clients (with an average of 4.27) were among the main factors influencing the librarian's attitudes towards using IOT. Attraction of more audiences to the library also accelerated the process of utilizing library services and simpler identification of customers' tastes using data collected from IOT with a mean of 4.0, more diverse use of library services with an average of 4.12, better time management for use the library services with an average of 4.17, ease of locating information resources in the library with an average of 4.15, receiving better and classified client requests, with the average of4.40 were other the influential factors in relation to clients in the use of IOT.

3. What are the capabilities of IOT to improve the services of academic libraries in the viewpoint librarians?

Table 3: Performance indices of the Internet of Things

Performance of the Internet of Things	Average
Rising library security and better entry and exit control	4.40
Creating a robust and integrated database for better library management	4.44
Gathering more relevant and reliable information faster	4.21
Collecting information more accurately and with less percent of error	4.25
Updated real-time analysis of data and improving the decision-making process	4.28
Providing resources to library patrons timely	4.29
Providing services to library users quickly	4.41
Facilitating information literacy training for library users	4.22
Providing better services to specific groups	4.23

According to Table 3, the creation of a robust database with an average of 4.44% was considered by most of the librarians as the best capability of IOT. Increasing library security and better control of entry and exit with a mean of 4.40, collecting more relevant and reliable information with an average of 4.14, more accurate data collection and lower error rates with an average of 4.25, updating data and improving the instantaneous analysis of the decision-making process with a mean of 4.28, provision of resources to library users with a mean of 4.29, fast delivery of services to library visitors with an average of 4.14, facilitating the provision of information literacy to library visitors with an average of 4.24, better service to specific groups with an average of 4.24 were considered among the other capabilities of IOT and the view of participating academic librarian in the present research.

4. What is the proper pattern for using IOT in academic libraries?

Table 4 : Descriptive indicators related to the use of the Internet of Things in the library

Sections	Average
Loan section	4.45
Ordering section	4.23
Reference section	4.18
Multimedia section	4.39
Library management	4.38
Library equipment and supplies	4.28
Reading room	3.99

The stack	4.20
Technical services department	4.32

According to Table 4, the lending area has the highest average (4.45) and the study section has the lowest average (3.99), which is remarkable for librarians due to the efficiency of the Internet technology (IOT). Friedman's test was used to see if the differences between the sections were meaningful, and If IOT was more effective than the textbook view. Friedman's test was used for prioritization. It can be seen that there is a significant difference between the priorities of different sectors or that the difference in mean was due to accident. In Tables 5 and 6. The results are visible.

Table 5: Descriptive Results of Friedman's Test (n=113)

Sections	Average
Loan section	5.51
Ordering section	4.93
Reference section	4.81
Multimedia section	5.40
Library management	5.31
Library equipment and supplies	4.88
Reading room	4.09
The stack	4.75
Technical services department	5.31

Table 6: Results of Friedman's test (n=113)

Friedman test	Test statistic
Chi square test	38.01
Degrees of freedom	8
Significance level of the test	0.000

As show in Table 6, the significance level of the test (0.000) is considered to be less than 0.05 error, so it can be said that with 95% confidence, between the, there is a significant difference in the priority of having IOT among the different sectors The highest rank belongs to library lending department. Therefore, in the of view point of academic librarians, IOT in the lending department can be more effective and efficient.

Discussion and Conclusion

The Internet of Things, according to the tools provided by the libraries, is able to increase the speed of provision of services and perform the activities related to such services (for example, book exhibitions, meetings, etc.) with more ease .Libraries are always exposed to damages such as fire and accidents due to the old infrastructure. In addition, libraries face specific damages alongside their functions, which must be managed in order to minimize them. Theft of resources that is sometimes irrelevant in some libraries is one of the damages that libraries face and need to tackle it. In both cases, unplanned incidents and robbery, the use of IOT technology can be very useful. Of course, if the library building is located on the columns and the sections can be easily separated, you can provide more space without having to spend much time and manpower through the use of sensors installed on the equipment for libraries that lack space. Research findings revealed that Iranian librarians pointed to the benefits of IOT in retrieving accurate information related to the needs of users without applying experience-based practices. They also point to the ability of the IOT to record the users' interests in doing personal activities and sharing knowledge and skills with other users.

One of the challenges posed by the librarians was the low or definitive speed of the Internet, which would make all activities unthinkable; hence libraries need to provide the technical infrastructure appropriate to this technology. Li (2013) and Alwadi, Kilby and Gawanmeh (2017) worked on the use of RFID in the management and trust departments, Moon et al. (2014) on using IOT in different parts of the library, Yu Sang (2014) on energy saving in the library, and Hoy (2015) on a general review of library applications on the challenges of IOT, focusing on the teaching of this technology in the library. Therefore, the results of this research are consistent with them.

Considering the viewpoints of Iranian librarians in this study, the lending department can use IOT technology more than the other sectors. Subsequently, the multimedia department, the library management department, the technical service department, the order section, the library equipment, the reference section, and the repository do not need IOT that much. This attitude get the roots in two factors. First, librarians have experience or are familiar with the applications of IOT in the loan department more than its usages in other departments, and secondly, librarians limit applications of IOT to their activities and do not pay due attention to the needs of users. So, it seems that the need to use this technology is very evident in all parts of the library. According to the view point of librarians in the studied academic central libraries, IOT can be used in different parts of libraries. In the library management department, IOT promotes the awareness of staff regarding the needs of, users, and on the shortages of library resources by receiving instant, accurate and accurate reports. Managers can monitor their employees' activities, compliance with library standards and management processes using accurate reports and data collected by IOT technology. In the lending department, IOT facilitates the speed of the lending process and facilitates activities such as resource lending, returning resources and sorting the shelves after delivery of the resources.

In the reference section, IOT will greatly increase the speed of responding to user queries, through facilitating the management of priority and timely response to questions, creating a database of reference interviewing, and collecting data for future use and current reports. The dynamism of library building and its equipment is of other usages of IOT, which makes the library be able to always be ready for new activities and risk prevention One of these applications is the automatic adjustment of lighting, temperature, humidity in line with the library standards, the flexibility of automatic library equipment to convert space for various uses, such as sessions and workshops, the use of augmented reality technology for current knowledge, and introduction of resources dynamically.

Considering the results of the research, the advantages of using IOT technology in academic libraries include:
- Optimized library management
- Energy saving
- Saving accountability time
- Ease of doing activities
- Improving librarian's performance

Dynamics of library building and equipment
- as well as quality and quantity of work
- Satisfaction of users with library space, resources and services
- Facilitating the provision of services to special users

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