

# **Designing a Green Library Evaluation checklist**

Mahboubeh Ghorbani

PhD in LIS & Deputy General manager of Research and Education, National  
Library and Archives of I.R.of Iran

Mahghorbani1353@gmail.com

## **Abstract**

The aim of this study is to adjust a set of criteria for evaluating green features of libraries and provide a guideline for greening libraries. The criteria were gathered by reviewing green buildings standards and literatures such as Leed and green libraries studies, and also through interviews with experts in the field of environment and library science and analyzing their responses.

The results of this study are presented in a checklist containing 103 criteria in 7 section. The sections are Building and equipment, Strategic planning and management, Creating motivation, commitment and culture in librarians towards environmental management, collection development, information organization, information dissemination and participation and supporting national and international sustainable development programs.

finally, was conducted a survey to evaluate Iranian Academic Libraries green features using the checklist the first stage of study. The research population was comprised of the managers of Iranian Academic libraries affiliated to the Ministry of Science, Research and Technology, Ministry of Health, Treatment and Medical Education, Iran's Islamic Azad University and a total of 186 libraries were included.

The results showed that, green library criteria were observed average in Iranian academic libraries

Key words: Green Library, sustainable development, academic libraries

## **1. Introduction**

The library is an institution which plays a part in the development of societies. Marcum (2009, 10) believes that libraries do not operate in a vacuum and are a part of information provision system and meet educational expectations. Schera (1976, quoted in Tuamsuk, 2015) states that library is

a large part of social system created by the people who play roles to meet social requirements. With strengthening the role of libraries in sustainable development and highlighting environmental issues in the context of sustainable development, libraries also operated as the protectors of environmental organizations, and to establish their environmental indices they made some attempts to realize green library. Green Library Movement started in the early 90s, and it absorbed much interest in the library profession since about 2003. A growing number of librarians, libraries, municipalities, provinces, universities and schools tended to create green library to be able to reduce environmental impacts. This innovation takes place by creating library's green building, making existing library equipment into a green one, providing green library service, and taking environmental sustainable and supportive measures in the library (Antonelli, 2008, 1). Online Dictionary for Library and Information Science (ODLIS) defines Sustainable Green Library: it is a library is to minimize the negative effects on the natural environment and to maximize indoor air quality by choosing exact tools, use of natural materials and dissoluble products, resource conservation (water, energy and paper) and responsibility for recycling waste and garbage (recycling, etc.). Based on this definition, Green Library is designed to maximize the positive effects on cultural, economic and environmental aspects within a community.

Extensive studies have been performed to determine environmental management indices for Greening Libraries, and each study proposes various definitions and requirements on such type of library. Anotnelli (2008, 4) enumerates several reasons for libraries' tendency toward the construction of green building or green equipment in their buildings. Firstly, the cost to construct green buildings is low. It is now possible to create green buildings for libraries with a low budget. Secondly, easily-available energy resources are non-renewable resources and they are vital for the planet health, and due to library limited budget, it is more rational to use energy resources more wisely. Thirdly, it is important to reduce carbon effects on the buildings.

According to Marcum (2009, 10) green library approach underlines facilitating energy productivity, reduction in environmental impacts and avoidance of environmental materials and chemicals for creating a more healthy building and environment. Positive impact on the health and productivity of employees is the value added hidden in Green Library process. However, libraries are something other than a mere building, and overcome printable and digital problems is the main challenge to Green Library. Rodney and House (2010, 3- 4) enumerate one of the key consequences in the Green Library texts as the need to encourage the library to create a sustainable

building for the library. In this type of buildings, less resources and energy are consumed, and they are more integrated with societies and locations. Use of them is easier; they take advantage of natural light, and are easier and more attractive for clients and employees.

Connell (2010) proposed practical ideas that significantly reduce energy consumption in the library, which include the selection of computer equipment labeled with energy productivity, integration of servers in large enterprises, the use of virtualization and thus increased sharing of computing power of the computers between users, conscious management of equipment replacement and repair of old computers, finding ways to recycle electronic waste, recycling printer cartridges and selection of green varieties, decreasing the overall paper consumption and using recycled products without chlorophyll and green paper. To make libraries green, Oyelude & Alabi (2013, 2) proposed redesigning and better utilization of equipment and library facilities to reduce its negative effects on the environment, the use of natural and renewable energy sources such as solar energy and less dependence on fossil fuels, plantation of green trees and plants in library campus to reduce heat and to utilize air system, water efficiency, reduced printing and copying paper, promote and develop digital libraries and e-books, and provide electronic trainings. Hauke & Werner (2013, 2) proposed various activities for making libraries green including use of environmentally friendly and recyclable materials, offering virtual services to users, separation of garbage, remove the plastic bags, restrict the use of disposable containers and use of paper glasses and selection of providers with green certification.

Hauke (2014, 1) also believes that Green Library is characterized by minimizing “the negative environmental effects” and maximizing “quality indoor” using the selection of an exact location, the use of disposable natural building materials and environmental products, conservation of resources (water, energy and paper) and responsible waste disposal (recycling, etc.). However, from his view, Green Library is not necessarily confined to green building, and bears a green mission as well.

Shah, Kumar & Kumar Shah (2015, 2) regard some factors as necessary to realize Green Library Project including suitable location for green library depending on population, local access and parking lot, weather conditions, water conservation, energy conservation and use of alternative energies, use of recyclable materials and construction materials in the area and the library, and lesser use of wood, forests, control of indoor air quality and minimal use of air conditioning to reduce gas pollution that can cause damage to ozone layer and lead to further global warming.

Quoted from Shah, Kumar & Kumar Shah (2015, 2), Brawn regarded green design elements that can be considered in libraries as community participation, green materials, green roofs, raised floor system, energy efficiency, natural ventilation, green and renewable energy, and indoor air quality. In addition, he believes that some decisions must be made about resources, and librarians should be trained regarding green measures and green resource programming, and they must collect green information resources for their users.

Nowadays, standards, diverse certification issuance systems, different ranking and labeling procedures such as ISO 14000 series, LEED Certificate, BRIM (BRI Evaluation Method), Energy Star scheme, etc. have been developed for buildings, etc. which are useable for green libraries as well. However, none of them directly focuses on green libraries, and a proprietary certificate other than building indicators is required. For example, LEED system was established in 2000 by the United States Green Building Council for scoring of design and construction of green buildings in US, and the system evaluates buildings in seven categories including water, energy and air, resources and materials, indoor air quality, regional priority and innovation in design (Hauke, 2014, 2).

Academic libraries as public places can implement some critical functions such as provide good examples for Green Library, dissemination and publication of this idea among the people, and promote civic engagement in sustainability. There are certain aspects of sustainability in building libraries that should be taught to students and librarians to be able to adapt themselves to libraries' sustainability goals by restoring the old building for better use of the library (Hauke and Werner, 2012, 60).

Wright (2002, quoted in Rowley, 2006, 275) believes that in academic context and in conjunction with Academic libraries and in the context of sustainability in higher education, some factors such as moral obligation, sustainable physical measures, promote the research in the area of sustainability, public development, partnerships with government, non-profit organizations, and also ecological literacy industry should be taken into account. *Association of College & Research Libraries* (ACRL) in US introduces increasingly complex challenges in relation to academic and research issues faced by libraries, and the major challenges include environmental issues, present and preserve information in different forms and using different procedures, etc. According to the guide published by this association, to design library space, some actions such as library needs assessment and environmental monitoring, green space plans and budgets and LEED certificate

(Leadership in Energy and Environmental Design standard) should be addressed and analyzed by the designers. In addition, the association presents some procedures to meet the community's needs to green information, and encourages libraries to do green acquisition by creating green and open spaces for green book groups and to provide facilities for watching environmental videos or presentations, create opportunities for children to be interested in ecology such as poster contests or poetry readings, resource selection based on organic and green agriculture and energy conservation, create library and book reading links and a collection of popular websites for environmental issues, develop relationships with local groups interested in the environment and perform research on information needs and interaction with local schools to support local green programs and schemes such as the green wall plans and ecosystem models (The Association of College & Research Libraries (ACRL).

Jia, Zijian & Zhi (2013, 151) acknowledge that, compared with common green public buildings, academic buildings must have extensive properties including compatibility and consistency with the environment, creativity and innovation in design, resource conservation, and health and comfort and they must be full of human concerns. Shah, Kumar & Kumar Shah (2015, 5) also stress that academic libraries are the places where students are in motion, and this increases air pollution and energy consumption.

According to Hauke & Werner (2013, 5-6), library strategic management can be easily linked with sustainability objectives, and it must present a green picture of library for all library stakeholders including universities, community or parent organization through adopting strategies. Concerning green building indices, paper consumption is of utmost importance. Undoubtedly, libraries, and specially public and academic libraries are the main consumers of paper consumption in the recent decades. Sources digitalization can increase people's expectations of sources. Digital environments also may produce unwanted items. Libraries require recycling policies or disposal of computer processors, disks and other storing media and cables (Rowley, 2006, 276-277).

Chowdhury (2012) believes that the requirements to establish a green academic library include sustainable information services development for universes at managerial, education, research and specialized levels through the replacement of analog sources such as printable information sources with digital content using green IT and cloud computing to reduce costs and energy consumption. In his view, green information service can have multiple economic and environmental benefits, which its most important benefit is to offer better educational and research information services.

Tseng (2007) evaluates professional, architecture and design characteristics of Bito Library in public libraries system in Taipei, and presents possible solutions to meet public expectations. The research findings have shown that creative and unique design and equipment can lead to a new trend in the areas of design in Taiwan which in turn can increase the visits to the library and enhance the visibility and improve the public's attitude toward the library. Marcum (2009) has done an assessment of library sustainability. He found that librarians play an important role in the Internet space, protect and organize knowledge to facilitate the design of educational environments. New sustainability challenges faced by libraries include new strategies for cooperation and collaboration, extensive cooperation of professionals and librarians, and process management and assessment.

Rodney & House (2010) in their research examined the development of “green” policies within the community of the libraries in North America and five public libraries in Canada and the United States. The results showed that all of the libraries under study take some actions to promote environmental culture in their communities, and library communities address environmental responsibility in any form or manner.

Connell (2010) has studied the effects of environmental selection of library resources. In this research, three factors were considered in the development of the complex including a) the choice of environmental information resources, b) resource elimination processes with an emphasis on re-application and resource recycling, and c) selection of resource format, in particular, printable or electronic. All of the three factors led to a reduction in the impacts of the carbon produced by library. In assessing the environmental impact of monographs and electronic resources, it was specified that books are mainly eco- and earth-friendly.

Xuan & Hongyan (2011) in their research examined a new project called Energy Saving and Libraries’ Emission Reduction in Libraries (ESERL) in Zhengzhou Library in China. The findings indicated that Zhengzhou Library is a successful example of this concept. Energy saving and new Green Building design of the relevant library building consists of five parts: integration of energy management systems in monitoring and control systems, glass coverage of complex vacuum of envelope building, energy-saving lighting systems, frequency conversion of air conditioners, air conditioning, and rain water utilization system. In the research, some of effective solutions to save energy on factors such as the configuration of the building, wall, window, air conditioning, lighting, water circulation system and other factors are presented. Abazari and Babolhavaeji (2012)

studied fossil energies consumption and replacement of new energies in the public libraries in Tehran. The authors evaluated use of different energy sources by various criteria such as cost of investment, operation and maintenance, Co2 generation, and electricity cost consumption using hierarchical analysis methods and other relevant procedures. The results show that the new energies are sustainable resources that will assist in maintaining a healthy environment free from pollution. In addition, these resources are reliable alternative sources for fossil energies in public libraries in the long run and can reduce energy costs. Due to the high cost of providing these energies and their required technologies, the government should provide necessary support and promote their use in public libraries.

Brodie (2012) studied issues and challenges relevant to the sustainability of new library in McGuire University in Sydney. Sustainable design and library's activities, library, library collection sustainability, reviewing the structure of library and its services are the issues that have been examined in this study. The results show that users are aware of the new library and they evaluated it positively. They also addressed the issues relevant to library building and service to improve sustainability.

Wilson (2012) examined Washington University Library sustainability in terms of organizational planning, and the findings represent sustainability indices of the library including reconstruction and rehabilitation of existing equipment instead of supplying new equipment, creation of proper virtual and physical spaces, ability to use technology in the new library, create new values for the library with technological choices, user-centered design of spaces and equipment.

Oyelude & Alabi (2013) examined sustainability issues in Nigeria libraries with emphasis on policy analysis and experience of green librarians and relevant advantages and shortcomings, librarians' awareness of green color of libraries, efforts to become green and green policies in libraries, and methods of advancement towards sustainable development. The findings obtained from the current research have shown that libraries are motivated to adopt green policies and activities, and they seek to implement the minimum sustainability standards. It has been also found that Nigerian librarians' awareness of environmental issues is relatively low, and increase in library users' awareness and all communities for making libraries greener is highly recommended.

Chakraborty (2013) examined Four Indian Academic libraries to receive green views on librarians' traditional activities and beliefs through interviews. The results indicate that these four universities have the same traditional heritage structures and have been created on the basis of

environmental guides, and the technology used should be sustainable, long-term, and recyclable. In addition, energy efficiency should be also taken into account.

Karioja (2013) in a study examined and compared the sustainability indices from the perspective of librarians from public libraries in Finland and several other countries in terms of environmental management, economic aspects of management, reducing environmental threats, increase public awareness about the environment and increase cooperation in the field of environmental libraries as libraries' sustainability indices. The results obtained from the research indicate that libraries must use environmental indices to assess their sustainability and commitment to the sustainability among library personnel should be in such a way that can introduce librarians as green scholars.

Sputore, Humphries & Steiner (2015) performed a research on Australian academic libraries' interaction with their users in completing traditional functions of reference services, and the research sought to analyze diverse and complex challenges in academic environments through partnership and collaboration, which is designated as a sustainability index. The results obtained from the research indicate that the benefit of users' cooperation in learning-related information activities is not the mere contributing factor for enhancing cooperation, and to solve the problem of providing universities with sufficient information and their ability to use new technology, libraries require cooperation and collaboration in this area.

In its research on libraries at Nairobi University, Achieng (2015) analyzed staff skills and some infrastructures such as digital repositories, online resources including subscribed databases, and access to resources in sustainable development and human evolution. The findings indicate how much a library has been able to understand information projects along with the emergence of new borders delimited by the research performed in this context. In addition, Nairobi University Library has an obvious knowledge gap in the field of environment, which is relevant to analytical information on environmental issues.

Bezerra Cardoso and Campos Machado (2015) analyzed Rio de Janeiro library study program for receiving LEED certification. In addition, the authors explained the project proposed by Ministry of Environment regarding creation of book series on environmental issues with the intention to develop green rooms and their facilities for environmental training in Brazil libraries, and finally proposed a national guideline for the implementation of public policies of green and sustainable libraries in the country.

Kraljević & Lukačić (2015) carried out a research on Croatia to determine the level of Croatia librarians' interest in participation in green library program. The results indicate that librarians are interested in participating in the program, and awareness of environmental protection issues among them is on a rising trend, and they are willing to participate in the development and analysis of environmental issues.

A review of the researches indicates the performed of the importance of green indicators for libraries to create green libraries. Most of the researches indicate to provide sufficient information and knowledge on environmental issues for users and librarians is one of the most important tasks of green libraries to realize sustainable development. Indices relevant to green buildings such as energy consumption management, water, electricity and waste management have been evaluated in most of the researches relevant to green libraries. Pay attention to digital resources in acquisition processes and provide unattended service in the dissemination of information in libraries, the role of technology in libraries sustainability are other issues that have been examined in numerous preceding studies.

In recent years, environmental problems have attracted attention of macro-management in various aspects in Iran. After World Summit on the ground (Environment and Development) in Rio de Janeiro in 1992, Activities affiliated to this field were entered to new field in Iran. In order to achieve sustainable development, libraries also need to review the design space, equipment, processes and services, and they must consider sustainability perspective in their management and environmental planning. Since the Libraries in the discussion of sustainable development and environmental protection are highly influential, they must be pioneers in the area of information, create commitment and motivation to serve society. This function and impact can range from design space and equipment to library activity management including acquisition, information dissemination and organization. Observance of green criteria to accomplish green library in designing library-based spaces in management and service provision by these libraries can provide a good example for other libraries and also cultural and scientific institutions on a higher level. This function and impact can range from design space and equipment to library activity management including acquisition, information dissemination and organization. Observance of green criteria to accomplish green library in designing library-based spaces ,management and service provision can provide a good example for

other libraries and also cultural and scientific institutions on a higher level. The aim of this study is to adjust a set of criteria for evaluating green features of libraries and provide a guideline for greening libraries.

## **2. Methods**

The current research is applied and it is performed by an evaluative survey method. The criteria were gathered by reviewing green buildings standards and literatures such as LEED and green libraries studies, and also through interviews with 12 experts in the field of environment and library science and analyzing their responses.

The results of this study are presented in a checklist containing 103 criteria in 7 sections. The sections are Building and equipment, Strategic planning and management, Creating motivation, commitment and culture in librarians towards environmental management, collection development, information organization, information dissemination and participation and supporting national and international sustainable development programs.

The Survey was conducted to evaluate Iranian Academic Libraries green features using the checklist the first stage of study as a questionnaire. The research population is comprised of the managers of Iranian central academic libraries affiliated to the Ministry of Science, Research and Technology, Ministry of Health, Treatment and Medical Education, Iran's Islamic Azad University and a total of 186 libraries were included. They participated in the research without sampling. To measure the criteria, Likert Spectrum was utilized. A questionnaire was distributed between libraries' managers, and they were asked to complete the questionnaire about their library. Finally, 145 questionnaires (i.e. 77.9% of the total number of the questionnaires) were received. To analyze the data obtained from questionnaires, descriptive and inferential statistical analysis methods were used in SPSS software. In the analysis of questionnaires, after summing the scores of each library, descriptive statistics indices and condition of the building and equipment in terms of the compliance with green standards were extracted.

### 3. Results

**First question:** how many of the criteria relevant to green library in building and equipment have been met? The status of library building and equipment includes seven sectors namely energy management, water, paper, waste, transport, noise and air, that the status of each one is shown in Table 1.

Table 1: Condition of library building and facilities

Descriptive indicators	Building and facilities	Energy	Water	Paper	Water	Transportation	Noise management	Air management
Mean	189.7517	54.4828	32.6690	16.3172	24.4621	24.2966	20.1310	17.3931
Median	190	56	32	5	24	25	19	18
Exponent	183	46	42	15	25	29	16	19
Standard Deviation	31.45003	11.42858	7.93993	5.78516	7.81382	5.93849	7.07328	5.18852
Variation Range	164	50	41	28	39	25	30	24
Min.	95	27	0	7	9	8	7	5
Max.	259	77	51	35	48	33	37	29

As seen in Table 1, the minimum and maximum scores relevant to library building and facilities are 95 and 259, respectively. The highest frequency of the point obtained is 183. In terms of condition of librarys building and facilities, half of the libraries received less than 190 scores and other half received higher than 190. The average rating for condition of library’s building and facilities is 189.

**Second question:** concerning management and planning in the academic libraries, how much attention has been paid to green library criteria? Table 2 shows the status of compliance with this criterion in the Academic libraries.

Table 2: Status of management and planning in Academic libraries

<b>Descriptive Indices</b>	<b>Management &amp; Planning</b>
Mean	16.34
Median	17
Exponent	17
Standard Deviation	4.47
Variation Range	25
Min.	6
Max.	31

As seen in Table 2, the minimum and maximum scores relevant to library management and planning are 6 and 31, respectively. The highest frequency of the point obtained is 17. In terms of condition of management and planning, half of the libraries received less than 17 scores and other half received higher than the point. The average rating for condition of library's management and planning is 16.43.

**Third question:** to what extent the condition underlying Academic library management can motivate librarians to show incentive, commitment, and acculturation with regard to environment protection?

Table 3 shows the status of compliance with this criterion in the Academic libraries.

Table 3: Condition of incentive, commitment, and acculturation among librarians

<b>Descriptive Indices</b>	<b>Motivation, etc.</b>
Mean	26.2345
Median	25
Exponent	24
Standard Deviation	8.68
Variation Range	31
Min.	9

Max. 40

As seen in Table 3, the minimum and maximum scores relevant to librarians' incentive, commitment, and acculturation with regard to environment protection are 9 and 40, respectively. The highest frequency of the point obtained is 24. Half of the libraries received less than 25 scores and other half received higher than the point. The average rating for condition of library's management and planning is 26.63.

**Fourth question:** to what extent acquisition and conservation of library resources in Academic libraries consider in accordance with green library criteria?

Table 4 shows the status of compliance with this criterion in the Academic libraries.

Table 4: acquisition and conservation of library resources

Descriptive Indices	Acquisition & Protection
Mean	38.2
Median	38
Exponent	47
Standard Deviation	10.38
Variation Range	54
Min.	16
Max.	70

As seen in Table 4, the minimum and maximum scores relevant to Academic libraries' acquisition and resource conservation are 16 and 70 scores, respectively. The highest frequency of the point obtained is 47. Half of the libraries received less than 38 scores and other half received higher than the point. The average rating for condition of library's management and planning is 38.2.

**Fifth question:** to what extent Academic libraries consider information dissemination and awareness rising for students and Faculty members?

Table 5 shows the status of compliance with this criterion in the Academic libraries.

Table 5: dissemination of information and awareness for students and Faculty members

Descriptive Indices	Information dissemination and raising awareness
Mean	44.9
Median	45
Exponent	45
Standard Deviation	8.54
Variation Range	38
Min.	22
Max.	60

As seen in Table 5, the minimum and maximum scores relevant to university acquisition and resource conservation are 22 and 60 scores, respectively. The highest frequency of the point obtained is 45. Half of the libraries received less than 45 scores and other half received higher than the point. The average rating for condition of library's management and planning is 44.9.

**Sixth question:** to what extent Academic libraries consider protection and support of national and international programs for environment protection?

Table 6 shows the status of compliance with this criterion in the Academic libraries.

Table 6: Academic library protection and support of national and international programs for environment protection & sustainable development

Descriptive Indices	Participation and Support
Mean	23.23
Median	25
Exponent	30
Standard Deviation	6.13
Variation Range	20
Min.	10
Max.	30

As seen in Table 6, the minimum and maximum scores relevant to Academic libraries' protection and support of national and international programs for environment protection & sustainable development are 10 and 30 scores, respectively. The highest frequency of the point obtained is 30. Half of the libraries received less than 25 scores and other half received higher than the point. The average rating for condition of library's management and planning is 23.23.

#### **4. Discussion and conclusion**

Based on the findings obtained from the current research, the status of the building and equipment relevant to the central libraries in the universities under study in terms of energy consumption management, green space and water, paper consumption management, waste, transportation management, noise and air management is relatively good. In analyzing the results, it could be said that green building management instruments are utilized, and the issue nowadays has received more attention, library is a suitable instrument in most of universities as part of a university campus or as an independent building on campus and is relatively in accordance with criteria for green management in the current research. In the guidebook presented by *Association of College & Research Libraries (ACRL)* in US, to design library space, LEED certificate (Leadership in Energy and Environmental Design standard), which includes building and equipment standards, is emphasized. In addition Zijian & Zhi (2013, 151) have considered some factors as essential for environmental protection including energy conservation, reduce pollutants, reduce waste, public transport schedules, and monitoring water consumption. Brodie's (2012) research also investigates the properties of a sustainable library from the perspective of good users. The status of management and planning in academic libraries show that most of these libraries is in an average condition. In analyzing this result, it can be said that the management of academic libraries is a part of a training institution, and the management and planning in academic universities is subject to academic management policies. For this reason, as long as the university has not a green approach to its management, this approach is not reflected in library management. On the other hand, management built upon sustainable development and strategic planning in this field in Iranian Academic libraries is a new subject and has a long way to be evolved. In this context, Marcum (2009) examined importance of process management in library sustainability, and the findings show that process assessment and management are challenges faced by libraries that must be addressed. In their research "development of Green policies", Rodney and House (2010)

evaluated practices, strategic plans, missions, and vision documents, and concluded that these issues are still not advocated in the Green Library. According to the statement of objectives, mission and organization and library's vision, *Association of College & Research Libraries* (ACRL) stated that strategic plan of organization and library and also environmental issues are effective factors in library designing. In the overall assessment of motivation, commitment and acculturation among the staff to protect the environment by library managers, it should be acknowledged that the library managers have been somehow successful in this regard, and given the average score obtained in this benchmark by academic libraries, it can be concluded that the status of observance of this criterion by managers was better than average. The role of management to motivate and engage employees to preserve the environment in every organization is significant. Given the heavy mission of libraries and especially Academic libraries, this role becomes more prominent, and it can be considered as a necessity to sustainable management in a library that managers can obtain it through proper management. The outcome of the assessment of this measure depends on managers' incentives and commitment, and indicates the significance of this issue from their own perspective. In addition, management and planning trend followed by them positively affects staff. The promotion of green culture and increase in commitment of librarians and library community to environment and sustainable development was considered in the research performed by Marcum (2009), Karioja (2013), Oyelude & Alabi (2013), and Kraljević & Lukačić (2015) and the authors underlined the impact and role of libraries' managers. Acquisition and preserve library resource is a specialized process in the libraries that must be considered in sustainability discussions. Collection and preservation of digital resources, pay attention to the environmental impacts of library resource preservation systems and collection of the resources in the area of environment conservation systems are essential requirements in sustainable management of acquisition and library preservation. According to survey results, most libraries under study are in an intermediate state in terms of green acquisition and perseverance of library resources. One of the reasons for this result is that the issue of digital acquisition is a newly emerged one and universities and libraries' managers are not highly familiar with the importance of the environmental impacts of such measures. The issue of budget and fund in libraries to adopt green policies such as non-application of chemical pesticides or change in resource acquisition processes from printable into digital can be one of the reasons for this issue. Two issues of acquisition and environmental protection were underlined in the research performed by Rowley

(2006), Connell (2010) and Sputore, Humphries & Steiner (2015). Given the results obtained from an evaluation of status of information dissemination and raising awareness of student and professors based on green criteria, it could be said that the libraries surveyed in the current research are in a good situation in this regard. Disseminating information and raising awareness are two major functions of each library. In the area of sustainable management, library not only should fulfill its sustainable indicators but also it should strengthen sustainability culture among users and enhance their awareness of environmental issues. Given that the most important task of Academic libraries is to support education and research programs of each Academic, pay attention to environmental issues in education and research plans adopted by each university can lead to the development of library activities in this regard. In addition, academic libraries management follows university policies and inattention to environmental issues in large-scale plans of universities can affect library management. In this regard, budget constraints and academic libraries' facilities can play effective parts. Thus, the average state of libraries in terms of disseminating information and raising awareness on environmental issues is not unexpected. The research performed by Oyelude & Alabi (2013) underlines and recommends the importance of increasing awareness among libraries' users and all community to make libraries greener. The research performed by Bezerra Cardoso and Campos Machado (2015) analyzed the creation of book series on environmental issues with the intention to develop green rooms and their facilities for environmental training in Brazil libraries. *Association of College & Research Libraries* (ACRL) in US also offers some procedures to fulfill the community's need to green information, and encourages libraries to create green and open spaces for green book groups and to provide facilities for watching environmental videos or presentations, create opportunities for children to be interested in ecology such as poster contests or poetry readings, resource selection based on organic and green agriculture and energy conservation, create library and book reading links and a collection of popular websites for environmental issues, develop relationships with local groups interested in the environment and perform research on information needs and interaction with local schools to support local green programs and schemes such as the green wall plans and ecosystem models (*Association of College & Research Libraries* (ACRL), United States, 2016). Chowdhury (2012) believes that green intelligence service can fulfill the objectives of United Nations in terms of sustainable development in education sector. To develop sustainable information service for academicians at the levels including management, education, research and specialty, Chowdhury

believes that information services should be developed, and this can be realized through the replacement of analog sources such as printable information sources with digital content using green IT and cloud computing to reduce costs and energy consumption as the requirements to establish a green academic library. In the overall assessment of the participation and support provided by national and international libraries from national and international programs in the area of environmental protection and sustainable development, it should be noted that according to the findings, the status of this evaluation is on an average level, indicating the awareness and interest of library managers in the issues related to sustainable development and environmental protection and also participation in these activities. Participation in such programs has been underlined in the research performed by Rowley (2006), Marcum (2009), Rodney and House (2010), Kraljević & Lukačić (2015), Connell (2010) and Sputore, Humphries & Steiner (2015) for green libraries, and in general, participation and cooperation in environmental protection is one fundamental necessity of sustainable development.

Based on the findings of this research, the following recommendation can be presented for academic libraries:

- 1- The implementation of green management plan in library in coordination with green management association to implement standards relevant to management of energy, water, waste, paper, air, transportation, for making libraries into green ones.
- 2- Library planning for green acquisition according to the collected digital resources and environmental issues.
- 3- Library planning for information dissemination and awareness raising programs and some programs such as holding meetings, film screenings, lectures and participatory programs.
- 4- Interaction with academic education and research to strengthen and pay attention to environmental issues in determining the study course and research plans.

### **References:**

Abazari, Z., Babalhaveaji, F. & Jahangirifard, B. ( 2012). GIS - based Evaluation of Public Libraries Locations for More Sustainable Building Site Selection (An Iranian Experience). Paper presented at IFLA WLIC 2012 -helsinki Retrieved January 17, 2017 from: <http://conference.ifla.org/past/ifla78/184-abazari-en.pdf>

Antonelli, M. (2008) the green library movement: An overview and beyond, *electronic green Journal*, 1(27), 1-11. Retrieved November 21, 2016 from <http://escholarship.org/uc/item/39d3v236>

Achieng, Jane (2015) Preparedness of University Libraries as drivers for green transformation and sustainable development: the case of University of Nairobi Library, Kenya. Paper presented at: IFLA WLIC 2015 - Cape Town. Retrieved may 31, 2016: <http://library.ifla.org/1320/1/137-breeding-en.pdf>

The Association of College & Research Libraries (ACRL) (nd) Academic Library Building Design: Resources for Planning. Retrieved may 31, 2016 from <http://www.ala.org/acrl/academic-library-building-design-resources-planning>

Bezerra Cardoso, Nathalice and Campos Machado, Elisa (2015) Sustainable and Green Libraries in Brazil: Guidelines for Local Governments. Paper presented at: IFLA WLIC 2015 - Cape Town, South Africa. Retrieved may 31, 2016 from <http://library.ifla.org/1207/1/095-cardoso-en.pdf>

Brodie Maxine (2012) Building the sustainable library at Macquarie University, Australian Academic & Research Libraries, 43 (1) 4-16. Retrieved January 17, 2017: <http://www.tandfonline.com/doi/abs/10.1080/00048623.2012.10722250>

Connel, Virginia (2010) Greening the Library: Collection Development Decisions, The journal of the new member's Round table, 1(1)1-15.

Chakraborty, Susmita (2013) Going green or not: realities of the Indian metropolis libraries paper presented at 79th IFLA general conference and Assembly, Singapore. Retrieved may 31, 2016 from <http://www.ifla.org/en/ifla79>

Chowdhury, G. (2012) Building Environmentally Sustainable Information Services: A Green IS Research Agenda, *Journal of the American Society for Information Science and Technology*, 63(4):633–647. Retrieved June 2, 2016 from <http://onlinelibrary.wiley.com/doi/10.1002/asi.21703/full>

Hauke, P. (2014) How to become / How to identify a Green Library? Standards for Certification, Retrieved may 31, 2016 from <http://library.ifla.org/1237/1/095-hauke-en.pdf>

Hauke, P.; Werner, K. U.(2012) The second hand library building: Sustainable thinking through recycling old buildings into new libraries, *IFLA Journal*, 38(1) 60–67. Retrieved June 13, 2016 from <http://ifl.sagepub.com/content/38/1/60.full.pdf+html>

Jia, G., Zijian, C., Zhi, T. (2013) To Build a Green University Library- Architectural Design of Hefei Institute Library, *Applied Mechanics and Materials* .Vols. 368-370, 150-155. Retrieved June 13, 2016 <http://www.scientific.net/AMM.368-370.150>

Karioja, Elina (2013) Sustainability in libraries, Bachelor´s thesis, Degree Programmed in Library and Information Services, Oulu University of Applied Sciences, retrieved January 17, 2017 from:  
[http://www.theseus.fi/bitstream/handle/10024/56815/Karioja\\_Elina.pdf](http://www.theseus.fi/bitstream/handle/10024/56815/Karioja_Elina.pdf)

Kraljević, Ivan& Lukačić, Petar (2015) Project Green Library in Croatia, Retrieved November 19, 2016: <http://library.ifla.org/1208/1/095-kraljevic-en.doc.pdf>

Marcum, James W. (2009) Sustainable library imperative Design for sustainability, *The Bottom Line: Managing Library Finances*, 22 (1) 9-12. DOI 10.1108/08880450910955378. Retrieved November 19, 2016:  
[www.emeraldinsight.com/0888-045X.htm](http://www.emeraldinsight.com/0888-045X.htm)

Oyelude, Adetoun Adebisi& Alabi, Adefunke Olanike(2013) Greening: Pluses and Minuses of Nigerian Libraries in Promoting Environmental Sustainability: Retrieved November 19,2016 <http://library.ifla.org/133/1/115b-oyelude-en.pdf>

Rodney, A.; House, S.(2010) Going Green in North American Public Libraries: A Critical Snapshot of Policy and Practice. Paper presented at 76th IFLA general conference and Assembly, Gothenburg. Retrieved may 31, 2016 from <http://www.ifla.org/en/ifla76>

Rowley, Jennifer (2006) Libraries and environmental management, *Library Management*, 27 (4/5), 269-279. DOI 10.1108/01435120610668205. Retrieved November 19, 2016:[www.emeraldinsight.com/0143-5124.htm](http://www.emeraldinsight.com/0143-5124.htm)

Scherer, Jeffrey Allen(2014) Green libraries promoting sustainable communities, Retrieved November 19,2016: <http://library.ifla.org/939/1/152-scherer-en.pdf>

Shah, L., Kumar, S.; Kumar Shah, M. (2015) GREEN libraries in academic institutions: need of the hour. *International journal of Research Granthaalayah*, 3(9). Retrieved May 31, 2016 from [http://granthaalayah.com/Articles/Vol3Iss9SE/22\\_IJRG15\\_S09\\_45.pdf](http://granthaalayah.com/Articles/Vol3Iss9SE/22_IJRG15_S09_45.pdf)

SPUTORE, Alissa and Humphries, Philomena and Steiner Nola (2015) Sustainable academic libraries in Australia: exploring 'radical collaborations' and implications for reference services. Paper presented at: IFLA WLIC 2015 - Cape Town, South Africa Retrieved may 31, 2016: <http://library.ifla.org/1078/1/190-sputore-en.pdf>

Tseng, Shu-hsien (2007) Green library design and evaluation: the Taipei Public Library, *Taiwan, New Library World*, 109 (7/8), 321-336. DOI 10.1108/03074800810888159. Retrieved November 19, 2016 [www.emeraldinsight.com/0307-4803.htm](http://www.emeraldinsight.com/0307-4803.htm)

Tuamsuk, K.(2015) Asian Aspiration: Roles of Libraries for sustainable Development. Retrieved November 21, 2016 from <http://www.consaxvi.org/sites/default/files/Paper-%20Kulthida%20Tuamsuk.pdf>

WILSON (2012) Creating Sustainable Futures for Academic Libraries, *Journal of Library Administration*, 52:78–93. DOI: 10.1080/01930826.2012.630241 Retrieved November 19, 2016: <http://www.tandfonline.com/doi/pdf/10.1080/01930826.2012.630241>

Xuan, Wang & Hongyan, Li ( 2011) Energy Saving and Green Building Design of Libraries: the case study of Zhengzhou Library paper presented at 77 th IFLA general conference and Assembly, San Juan, Puerto Rico .Retrieved may 31, 2016 from <http://www.ifla.org/past-wlic/2011/196-wang-en.pdf>