Study on Barriers in Adoption of Data Warehouse for the Higher Educational Institutes

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Abstract

In today's hyper competitive world timely and accurate information can give the organizations a competitive advantage over its rivals. Moreover the enhanced student expectations in terms of digital learning experiences make it imperative for institutes engaged in Higher Educational Institutes to think about new technologies that shall enhance the operational efficiency of these institutes. But even though the utility of data warehouses and similar technology is recognized, many factors such as lack of funds and institute culture hamper the adoption of Data Warehouse. The level of adoption level of Higher Educational Institutes in form of present data management practices may also influence the adoption of Data Warehouse. In the present research paper presents barriers of Data Warehouse adoption. Hence it is suggested that in order to introduce Data Warehouse in Higher Education Institutes proper orientation of all stakeholders

Keywords: Data Warehouse, Barrier, Higher Educational Institutes, Adoption

I. INTRODUCTION

Now days, education has become private. The cut throat war exists everywhere. Planning is necessary for educational institutes for getting better decisions. The number of intake and branches are increasing rapidly.(Manjunath T N1, March 2011) The educational institutes are facing challenges regardinthe different requirementsts of students and academic processes. As Loo Fong Yee in his thesis (Yee, 2013) wrote that return of investment for Data Warehouse was insubstantial. Also, it was hard to be calculated. There was no proper relevant information and guideline which will help the top management.

It is mandatory for the academic institutes to produce funds which support academic activities, research activities and different types of operational activities because grant and fund provided by government is limited. DSS (Decision Support System) is one way for managing and operating the educational data in good manner. These types of system can create different problems based on accessibility and quality of data.(Nejres, April 2015)

II- NEED FOR STUDY:

In higher educational institutes and colleges are facing different challenges for preserving their status in the marketplace. New technology, financial pressures, demanding new requirement for staff and students are building a competitive surrounding. Any educational institute may have different systems for managing such type of data, but the problem is that these systems are not able to cope up with even easy questions of logical question. Data Warehouse was introduced to collect whole data from different places. After that Data Warehouse will integrate the collected data by applying the predefined policy. Two main sources in adopting Data Warehouse are as follows,

1. Internal source: Internal sources like consist of present operational systems

2. External sources: External sources such as competitive issues.

In today's business scenario Data Warehouse has become more important for enhancing decision making process, consequently to get the competitive benefits, so that the level of Data Warehouse adoption is becoming necessary to be exposed to an appropriate research work. However, the current research paper only underlines the level of adoption for Higher educational institutes and discover the barriers for Data Warehouse adoption.

III-LITERATURE REVIEW:

(Bhansali, February 2007) stated in his thesis that defines the term Data Warehouse as subject bound and time bound. It is also provides integration, anti volatile. (Inmon, 1996). Data Warehouse considers as an efficient decision supporting tools through incorporating the wide range of data into a particular repository. And from above integrated repository, decision makers can generate reports for analysis. (Meyer, 1998). This type of applications can be a variety of domains like corporate business, education, health, science and libraries.

Any organization the Data Warehouse offers the following benefits:

1. Enhanced integrated data
2. Decision Support
3. Data analysis
4. Improves efficiency
5. Customer management

   (Bhansali, February 2007)

There are mainly 4 characteristics of Data Warehouse given below:

1) **Subject oriented**
2) **Integrated**
3) **Time variant**
4) **Non-volatile**

Table 1: Data Warehouse Vs Operational Data

Data Warehouse	Operational Data
Management level use	Used by front-line workers
Read only access	Read/Write access
Historical register	Operational objectives
Strategic value	Tactical value
Unpredictable query pattern	Predictable query pattern
Access by weekly, monthly, quarterly reports	Access by predefined transactions
A lot of records in each access	Access to few records at once
Supports strategic direction	Supports day wise direction
Used for on-line analysis	Used for transaction processing
Data-driven: Data generate answers	Even-driven: Processes generate data

Source:(Bhansali, February 2007)

Figure 1: Data Warehouse Architecture

Source: http://datawarehouse4u.info
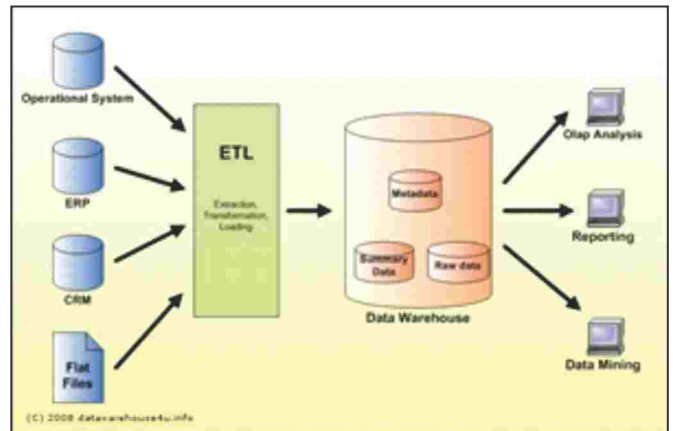
The above figure illustrates the important components of the Data Warehouse as follows:

- Ø Data sourcing
- Ø Data extraction, Conversion:
- Ø Administration
- Ø BI Tools
- Ø Metadata

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Organization Factors:

Factors like extent of the organization, apex executive support, group skill, existence of the title holder, difference of opinion amongst generations and organizational traditions affect Data Warehouse adoption. (Hwang, C.Y. Ku, & Cheng, 2004)

Literature Review, Analysis and Findings

Ø Data is accumulated from various sources in a distributed manner.

Ø The users are finding difficulties in tracing the reports required by them.

Ø In the decision making process, the present operating system will not be sufficient.

Ø Data Warehouse also differs from traditional operational systems and it was considered as a great tool for providing information to their users.

Ø Data Warehouse also creates reasonable benefits for supporting in the decision making process and its user's fulfillment. (Bhansali, February 2007)

Ø The current review of literature reveals different issues that may be affecting Data Warehouse adoption.

Ø It is noted that very few studies done on adoption regarding data warehouse technology.

IV – RESEARCH METHODOLOGY:

According to the nature of present research work descriptive type of research design was accepted.

Research Problem:

What are the barriers to adoption of a Data Warehouse in higher educational institutes and various factors pertaining to institute and individual level of preparedness?

Research Objectives:

1. To understand present data management levels for higher educational institutes.

2. To understand the significant barriers for higher educational institutes.

3. To understand the level of Data Warehouse adoption educational institutes.

Hypothesis of the Research :

H_01: The level of Data Warehouse adoption in administrative functional areas doesn't differ significantly across institute's attributes.

H_02: There are no significant relations between institute attributes and barriers regarding adoption of Data Warehouse.

V – DISCUSSIONS AND CONCLUSION:

Key Sample characteristics

Ø 81% of sample respondents consisted of males and 19% of females, thus the proportion of male to female are in the ratio of 4:1.

Ø 43% of sample respondents include faculty or teaching staff and 34% of the respondents include supporting staff which is in allegiance to observed staff ratio in most of educational institutes.

Ø 48% of the Institutes have reported either 2 or 3 courses with only 11% institutes reporting seven courses which include certificate programs.

Ø 80% of respondents have reported that the managerial control in their institutes was neither fully centralized nor decentralized and partial autonomy is granted to the stakeholders which may be an indicative prospect for the adaption of Data Warehouse.

Ø The majority of educational institutes does not have any specific IT plan to address the issues regarding data management, which may be the underlying cause for refraining from adapting of Data Warehouse.

Ø 91% of the institutes have scattered and stand alone data storage system which further highlights the need of a Data Warehouse in these organizations.

Ø Only one of the sampled institutes is having a centralized data management system in place.

Ø 84% of the institutes have reported using MS tools very often for accessing and reporting the data. Though the stakeholders access the reports very often, but at the same time they are dependent on traditional tools which may lack data integration capacity, thereby limiting the administrative and academic efficiency and effectiveness of the organizations.

Ø 96% of the institutes have reported that in terms of adoption of technology, these institutes lag far behind. Moreover the delay in adoption of technology may be one of the causes for reported lack of efficiency in day wise activities.

Ø 91% of respondents reported that they are not aware of any such technology of data management, which further may prove to be a main barrier to adoption of a Data Warehouse for educational institutes.

Ø The percentage of respondents with higher years of institute establishment is more as compared to new percentage of respondents with lower number of institute courses are more.

Ø The percentage of respondents with lower number of students since establishment is more.

Ø The average number of staff is 39 with a standard deviation of 11.

Ø The percentage of colleges with lower number of staff is more.

Barriers in adoption of Data Warehouse

Ø 48%, 56%, 53% and 55% of the respondents feel that lack of funds, guidance from institutional strategic objectives, decentralized nature of the data, resistance from data owners are very critical regarding implementation or introduction of a Data Warehouse in educational institutes.

Ø 66% respondents report lack of staff expertise as a critical reason for implementation of Data Warehouse.

Ø 3.36% each and 57% respondents are not sure about the exact role of institutional culture, institutional leadership and nature of current data practices in introduction or implementation of Data Warehouse.

Ø Only 10% of respondents feel that most of the criteria or barriers enlisted are not crucial in implementation of Data Warehouse.

In summary, it can be observed that major barriers pertaining to adoption of a Data Warehouse in educational institutes are lack of funds, the absence of institutional strategic objectives and absence of skilled manpower and resistance from existing data owners.

According to respondents the reasons for lack of enthusiasm for adoption of Data Warehouse, according to their level of critics are

Ø Absence of strategic perspective

Ø Cultural obstacles or change management

Ø Financial Barriers.

Table 2: Factor scores of barriers in adoption of Data Warehouse

	Component		
	1	2	3
Lack of funds	-.062	.317	.577
lack of staff expertise	.664	-.359	-.118
Informal inst culture	.066	.608	.164
Lack of guidance from Inst strategic objectives	.486	.448	-.076
Lack of Inst leadership support	.682	.139	-.059
Difficulty dev campus policies & procedures	.388	-.574	.336
Decentralized data	.041	.191	.351
Resistance from data owners	-.077	.775	-.775
Current practices are good	-.342	-.379	.087

Source: Primary data

Group 1: Lack of Strategic Perspective

It is observed most of the variables included in this group pertain to the strategic objectives of the institute. Further, these variables stem from lack of clear vision and mission and moreover the absence of leadership, commitment towards adoption of the Data Warehouse as a competitive advantage is reflected in this group and hence it is nominated as "Absence of Strategic Perspective"

Group 2: Cultural Obstacles

The variables included in this group are those which point towards the legacy and resistance to change as observed in many organizations. In fact the decentralization of data, absence of campus policies and resistance from data owners can be constructed to nominate a factor termed as 'Cultural Obstacles'

Group 3: Financial Barriers

In these group financial implications such as cost vs. benefit approach is cited as one of the reasons for adoption of Data Warehouse.

In summary, it can be observed that according to respondents the reasons for lack of enthusiasm for adoption of Data Warehouse according to their level of critics are

1. Absence of strategic perspective
2. Cultural obstacles or change management
3. Financial Barriers.

VI – SUGGESTIONS:

The success of Data Warehouse and alike software shall ultimately be dependent on user compatibility and user skills enhanced through proper training. It was observed that the individual characteristics such as awareness of Data Warehouse, present data management practices and frequency of access and data needs influence the opinion of the respondents towards Data Warehouse. Hence it becomes imperative to make the user aware through proper training programs so that the efficiency by implementation of Data Warehouse as envisigased is channelized.

VII – LIMITATIONS:

The major limitation of the study includes the sample size is limited which may be one of the limiting factors. Moreover the size and scale of operations of educational institutes, their readiness level in terms of technological adoption may further influence the choice of Data Warehouse intervention in educational institutes which further may be influenced by the location of these institutes. Hence the institute located in metro cities may have a different perspective regarding the adoption of a Data Warehouse in increasing operational efficiency. Moreover the study has not included the different Data Warehouse techniques which could have added value to the present study.

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