Management Decision System for the Documentary Archives in the Library of a Public Moroccan Institution: Case of Sultan Moulay Slimane University, Beni Mellal

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Abstract—This paper deals with the problem of management of information resources in libraries of the public institution Sultan Moulay Slimane University (SMSU) in order to analyze the satisfaction of the readers, and allow university leaders to make better strategic and instant decisions. For this, the integration of an integrated management decision library system is a priority program of higher education, as part of the Digital Morocco, which has a proactive policy to develop the use of new technologies information and communication in higher institutions. This operational information system can provide better services to the students and for the leaders. Our approach is to integrate the tools of business intelligence (BI) in the library management by using power BI.

Keywords—PMB, integrated library management system, ILMS, document, SMSU, power BI, satisfaction.

I. INTRODUCTION

THE vision of PODOCUSMS (Sultan Moulay Slimane University DOCumentary POrtal) project, presented in Section II below, is to modernize the governance at the Sultan Moulay Slimane University (SMSU) and to exceed the limits of traditional libraries (lack of decision, slow services, dissatisfaction of readers, ignorance, and scarcity of documents) in order to improve the quality of services offered by the university library, to meet the needs of readers, to help leaders to make better strategic and instant decisions, and to improve academic performance.

This work takes place in an industrial context due to the developments of ICT (Information and Communications Technologies) in the management of DIS (Document Information System), the significant growth in student numbers and documents, and the lack of decisions in the library.

The computerization of the SMSU library is important, because it will reorganize the work of the transition from manual to automatic system, and provide better service to users through access to remote catalogs via intranet or internet, and eases decision-making.

The limitations in the management of the traditional library in the SMSU include:
− Online reservation Problem

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− The problem of ignorance of documents
− Problem of dissatisfaction with documents
− Lack of decision makers from the staff of the SMSU regarding the reader services.
− The slowness of the services offered

In this article, we have been motivated by getting some ideas from [1]-[6] and [7]-[9].

Reference [1] defines the objectives of the management of documentary archive as follows:
1. The improvement of technical services.
2. Cost control.
3. The improvement of services to users.
4. The improvement of management tools.
5. Reorganization of the library.
6. The answer to the crisis of the manual system.
7. Cooperation between different catalogs and the prospect of the exchange of bibliographic data.

Reference [2] addresses the position of digital books in the libraries of French background. Reference [3] analyzes the documentary area outside as a place of mediation. Reference [4] realizes the municipal library in the satisfaction survey. Reference [5] did a study of the marketing of university libraries. Reference [6] carries out a survey of users of the university library in Paris. Reference [7] makes a comparative study between the ILMS available. Reference [8] makes a statistical study of open source used in librarian's institutions in India, and [9] makes a survey study the limitations of the use of information and communications technology of library professionals in some Nigerian Academic Libraries.

We can find some quality evaluation models of digital libraries based on users' judgments in view of to improve this quality from works [10]-[13].

After discussing the proposed issues, the limits of traditional libraries, the objectives and our motivations cited in the literature, the rest of this paper is organized as follows: We start by detailing the PODOCUSMS project in section II. It mainly includes presentation of data collection, justification for choosing the ILMS (Integrated Library Management System) PMB. Our proposal is given in section III. It mainly includes the used by the Power BI. Full experimental results (and of course, analysis) are reported in section IV. The paper is concluded in Section V including a few perspectives.

In the next section, we present the PODOCUSMS project.

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II. PRESENTATION OF THE LIBRARY OF THE SMSU AND PODOCUSMS PROJECT

The library of a public institution of Sultan Moulay Slimane University behaves four entities: Central Library, Library of PF (Polydisciplinary Faculty), Library of the Faculty of Science and Technology (FST) and of the Faculty of Letters and Humanities (FLSH). The main tasks of library system presented by the work [14] are defined in Fig. 1.

The PODOCUSMS project involves improving the management of libraries in the SMSU by implementing an integrated ILMS, which must seek to serve the priority needs of the users and to improving quality service.

As illustrated in Fig. 2, our proposed approach consists of several consecutive steps. It includes the use of the integrated library management system PMB (PHP My Biblio), collecting, extracting, transforming and merging the data with Power Query tool. After this, we use the Power Pivot tool to create a data model defining the relationships between the data incorporated with the power tool Query, and then we create reports in the form of interactive graphics using Power View; the tool Power Map is used to present the geospatial data in 3D. In our case, we have not yet created this format since we do not have the necessary data for the present (e.g. the distribution of readers of SMSU per city, and distribution of documents by country of author). Finally, these presentations allow us to evaluate the science of library and know the current status of the services offered by the SMSU library in favor of those readers, and its impact on the local scientific production.
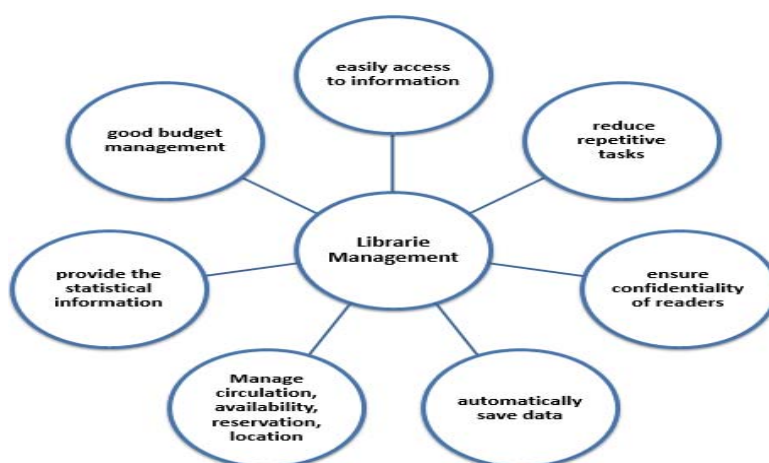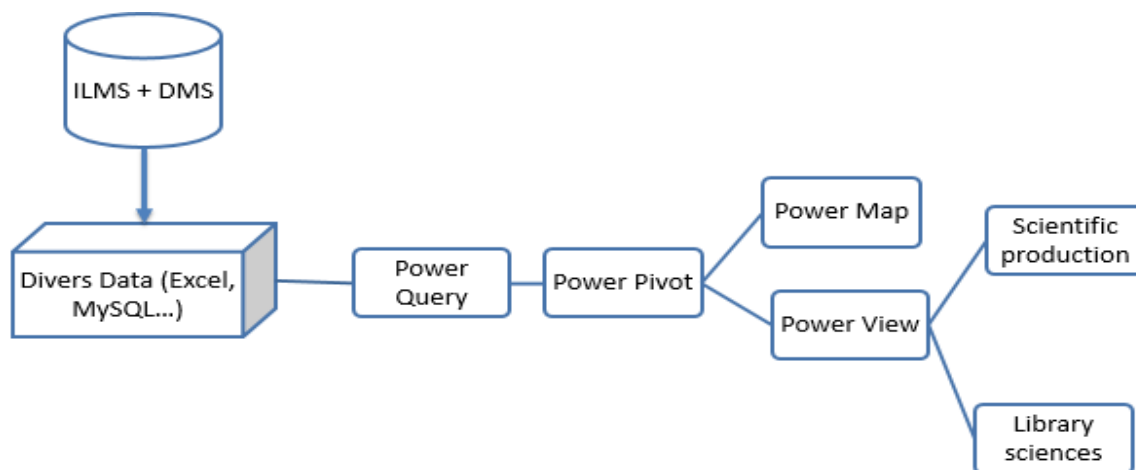

Fig. 1 The tasks of a library system

Fig. 2 Stage of this work

In Sections II *A* and II *B*, we present the data Collection of our system, and we justify the choice of the Integrated Library Management System (ILMS).

A. Data Collection

Data is extracted from the database stored in the data center of SMSU in Beni Mellal.

B. Justification for the Choice of the ILMS: PMB

PMB (PHP My Library) is an Integrated Library Management System (ILMS) free and suitable under CeCILL license, developed by the PMB Services Company.

The implementation of an automatic system for managing the documents is based on an open technology such as

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Apache, the server web pages; PHP, the programming language and extraction of data from the MySQL database and finally MySQL, for creating relational database. The choice of using the ILMS PMB is due to training sessions pursued within the university (on the creation of PHP and MySQL websites), the easy use of the software package, the features it offers and economic reasons. In what follows, we explain the use of the power BI to help measure the success of the library key factors.

III. THE BI TOOLS BI

A. Presentation

Business Intelligence (BI) is defined as the ability for an organization to take all its processes and capabilities and then convert these into knowledge, ultimately getting the right information to the right people, at the right time, through the right channel. The BI can allow an easy interpretation of a large volume of data.

To manage and measure the performance of the university, managers or policy makers need synthetic indicators that are grouped in the form a dashboard.

To make an assessment, it is interesting to address the following questions: why, how and with what tools should we evaluate?

We need to know precisely what we want to observe within

the law of SMART (Simple, Measurable, Ambitious, Realistic, and Temporal). For this reason, we must define evaluation indicators.

B. The Indicators and Dashboard

The dashboard is an instrument of control and comparison. However, the information system makes it a tool for dialogue and communication as well as a helping factor in decision-making.

We have developed dashboards to measure the evolution of reading students of the SMSU and their satisfaction and how decision support helps to promote local scientific production. Among the statistics that we can evaluate:

1) Number of registered by sectors
2) Number of registered by institutions
3) Number of registered per academic year
4) The most reserved documents
5) The most borrowed documents
6) Documents that are never borrowed
7) The number of reserved documents
8) The number of readers having the expired subscription
9) Statistics on the document by category of documents
10) Statistics on subscriptions (expired, renew)
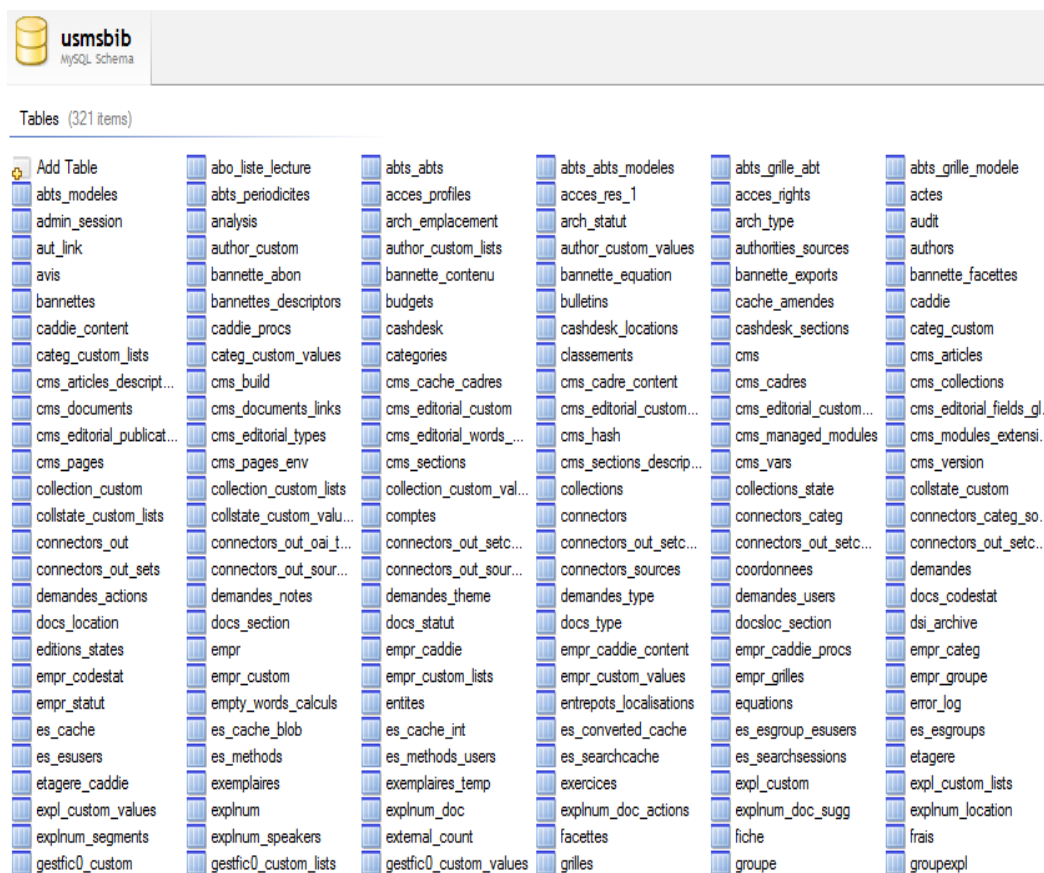11) The evolution of documentary deposits in SMSU per academic year, per categories and per author.

Fig. 3 Dataset extracts from data center on March 31, 2015

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To achieve a dashboard, it is essential to present the fact and dimension tables:

- Fact tables: loan, readers, readers' statistics, copy of documents.
- Dimension tables: support section, price, location, ownership, acquisition period, gender, class, age group, city, membership expiration date.

Fig. 4 Loan fact tables and dimension tables (Category, Support, and Gender)

Fig. 5 Copy of documents statistics by Section/ Support/ Location/ Price

C. Power BI

Power BI is a set of features that allow us to search, view and transform data, to connect to various data sources, incorporate them, and share dynamic reports.

To work with the Power BI tool, we can either use the features presented by self-service or in Excel 2013 using the BI Power Designer tool.
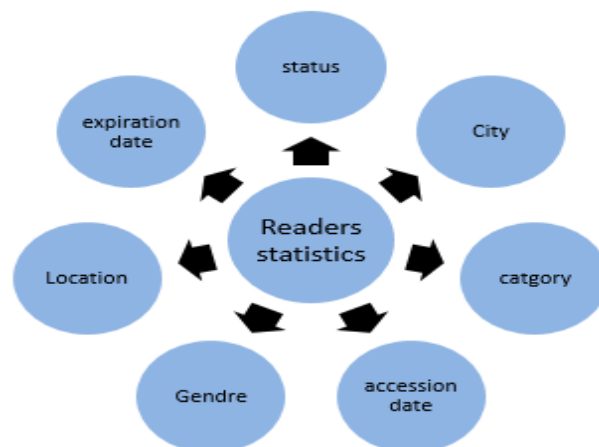
Fig. 6 Readers fact tables and dimension tables (Category, City)

Table I shows the services presented by the Power BI in Excel 2013.

TABLE I
POWER BI TOOLS

Tool	Description
Power Query	- Discover various data sources (Excel, Access, MySQL, Facebook, Wikipedia) - Transformation and fusion
Power Pivot	- Create data models by inserting Relations
Power View	-create easily reports and analytical views with interactive graphics
Power Map	- Explore geospatial data on a 3D map of experience in Excel

IV. RESULTS AND DISCUSSIONS

In this work, we use the database stored in the data center of the SMSU. Dashboards presented below were done until March 31, 2015.

TABLE II
LIBRARY STATISTICS

Total number of readers	Total copies	Number of documents never loaned
18637	14508	12220

TABLE III
LOANS STATISTICS

Title	Numbers of loans
Political Economy: Exercise and Corrected Exams	202
Economic decision in business	1
Fundamental microprocessors Course	0

Tables II and III allow us to conclude that it has enough books, about 8.5% (12220 copies), that are either in a state of ignorance or are not satisfied the readers. There is also the problem of books that are not imported into the digital library due to the high numbers, especially in the case of the Faculty of Letters and Humanities Sciences of Beni Mellal (FLSH).
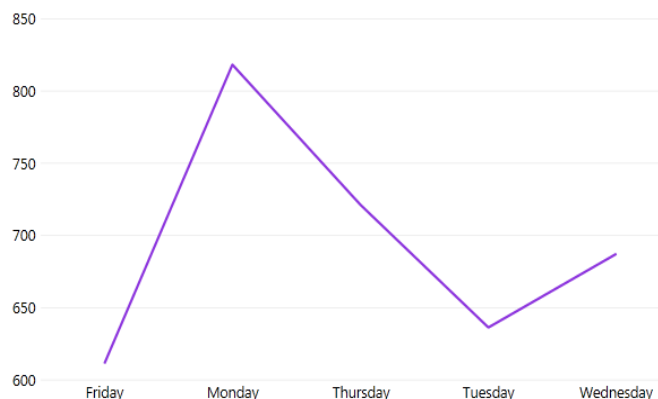
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Fig. 7 Number of loans per day for the PF library (from September 01, 2014 until March 31, 2015)

Time Slot	▲ Monday	Thursday	Wednesday	Tuesday	Friday	Total loan
08h-09h	17	1	5	1	0	24
09h-10h	41	38	52	33	50	214
10h-11h	94	112	103	109	121	539
11h-12h	82	64	87	64	40	337
12h-13h	12	4	7	10	0	33
13h-14h	0	1	6	5	0	12
14h-15h	24	15	15	10	0	64
15h-16h	102	120	82	62	66	432
16h-17h	82	78	71	73	107	411
17h-18h	33	20	23	18	31	125
Total	487	453	451	385	415	2191

Fig. 8 Number of loans per day for the PF library (from September 01, 2014 until March 31, 2015)
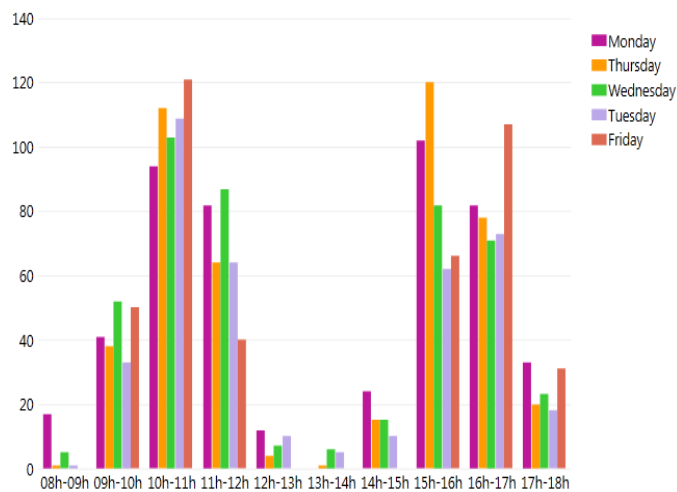
Fig. 9 Number of loans per day and per time slot or the FP library during examination period (from December 01, 2014 until March 31, 2015)

Figs. 7-9 allow us to deduce that the loan of documents is done in the first day of the week compared to the other days and more, especially in times of rest (around 10 am and 16 pm). However, in the period of exams, we see that there are fairly loans during the period of 10 to 11 am and from 15 to 16 pm, and then there is an increase in loans during the days of the week especially on Monday, Thursday and Friday.
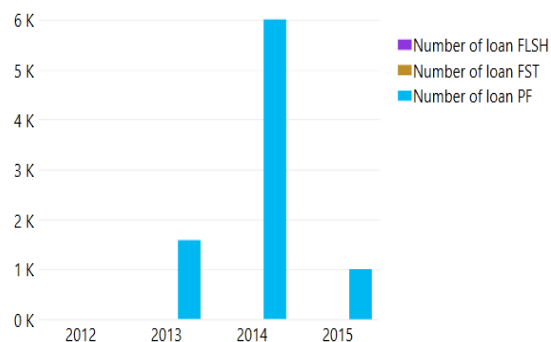

Fig. 10 Numbers of loans by faculty

Fig. 10 shows that the Faculty of Science and Technology and the Faculty of Humanities of Beni Mellal have not adopted this system. The first is due to the problem of training librarians to use the ILMS, the second is caused by the non-satisfying import of documents and the adoption of a different library management system.

This result shows that the Polydisciplinary Faculty of Beni Mellal is a test library for our search. However, we only import the database documents and the list of readers for the other faculties.
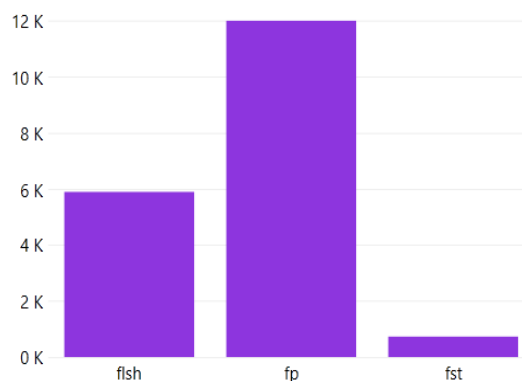

Fig. 11 Number of readers inside the SMSU

Section	2012_2013	2013_2014	2014_2015
Chimestry	0	317	185
Computer Science	0	69	24
Economics	13	789	462
Law	0	286	354
Management	12	1237	1041
Mathematics	1	1008	512
Pyhisics	15	762	782
Research	0	596	152
Total	41	5064	3512

Fig. 12 Number of loans per day for the PF library (from September 01, 2014 until March 31, 2015)

In the system, we can conclude that the number of readers imported (more than 12000) in the Polidisciplinary Faculty is more than in other faculties (Fig. 13).

The increase of the number of students of the

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Polydisciplinary Faculty opens a vital research in the management of documents in the library to improve the quality services.

Fig. 13 shows that the category of economics and management of documents are imported into the ILMS of the SMSU compared to other categories, and that the import of documents to the system is more important in the academic year 2013-2014.

The evolution of the numbers of active readers knew a great progress in 2014 thanks to the introduction of the ILMS (Fig. 14), but it knows an observable decrease, because, we finished this statistic on March 31, 2015.
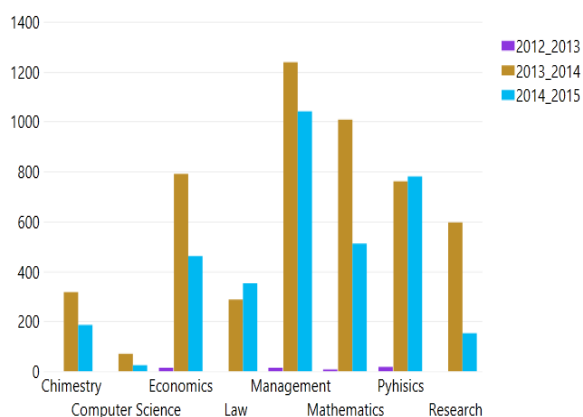
Fig. 14 Library statistics of the Polydisciplinary Faculty by category and academic years
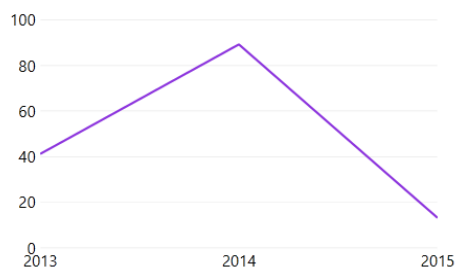
Fig. 15 Evolution of the number of active readers of the Polydisciplinary Faculty library
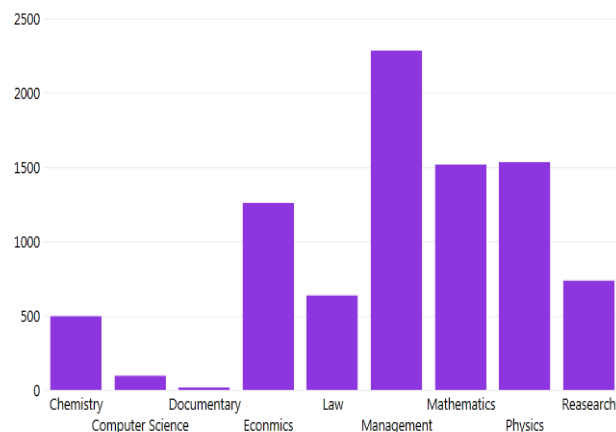
Fig. 16 Total number of loans by category from 2012 to March 31, 2015

Fig. 15 shows that Management documents occupy 29% of the total loan; the second position is occupied by the Mathematics and physics documents 18%, however Economics documents represent almost 15%, and in the last position the Computer Science documents 1%.
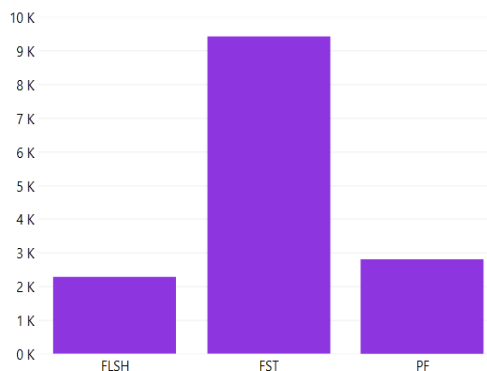

Fig. 17 Number of copies per location

In Fig. 16, we can see the status of the library documents of three Faculties; the FST library has imported more than 9000 documents in the ILMS, the FLSH about 2000 documents. However, the PF has imported less than 3000 documents.

Fig. 17 exposes several documents (3533 notices) that are in a state of ignorance or dissatisfaction of the readers of the SMSU library. For this, it is essential to think of other studies to easily get the right information for the right level of user, at the right time.

Fig. 18 Examples of documents never loaned (3533 notices)

V. CONCLUSION

In this work, we presented the management of information resources of the Moroccan public library, case the Sultan Moulay Slimane University of Beni Mellal, using the tools of

artificial intelligence Power BI, we used the library of the Polydisciplinary Faculty as a test library. The main objective of this paper is to improve the management of documents in the library of the SMSU. It has been found that the library suffers from many problems such as ignored and dissatisfying documents and the problems of lack of decision.

In our study, we have found that the digital books are very few or not available in the public libraries of the SMSU.

In the near future, we will propose a new method which will use an algorithm to help minimize the most ignored documents, and to optimize the search for the right information to the right level user at the right time.

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