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Characteristics of input to represent the valid values for mandatory authority parameters: A case study on library systems

Sivapackiyanathan Ketheeswaren[a]

[a]Deputy Librarian, University of Jaffna, Thirunelveli, Jaffna, Sri Lanka, Email:vskethees@univ.jfn.ac.lk

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The operations of library management depend on a set of library-specific parameters defined in a library system. The library-specific parameters are represented by data. One of the functions of a library system is storing data in the database for library management and services. The stored data should be valid for successful library management. The paper identifies the characteristics of input and the library parameters that were used in databases. The characteristics of input and the validity of the corresponding data stored in databases for mandatory library parameters were analysed. The study finds the system design and management required to store the valid data for the mandatory library parameter.

Keywords: List of values; authorised values; mandatory library parameters; system design; system characteristics

Introduction

The applications of a management system depend on the basic parameters drawn by an institution. The parameters are represented with unique values. The unique values are assigned for the institution's name, branches, service locations, addresses, types of products and services, the categories of staff, and the institution's operations. The parameters are usually represented with identifiable codes in the databases. The defined code is known as the values for the parameters. Yun and Chaoying[1] defines the module, permission, and authority as the different types of parameters used in a library setup.

Module parameters are specific for a particular functional setting. However, a module parameter sometimes includes the foreign parameters shared by other modules. For example, a parameter value for a bibliographic record (Biblio number) is included in the cataloguing module of a library system. Further, the same value is stored in the circulation module while lending the same library material to a reader. Permission parameters are used to set various permissions for library readers to ensure the safe and orderly operation of the system. For example, the parameter that stores the number of books that can be borrowed by a reader at a time prevents issuing books more than the limitation.

Another type "authority parameter" is under the focus of the study. Authority parameters are used for describing the records in a library database. The authority parameters reflect the managerial characteristics of a library. For example, an authority parameter stores a code for a shelving location available in a library. The library authority parameters may be standard for all libraries or branches or sometimes specific for an identified library or branch. The code representing the parameter becomes defined by a library, unique and fundamental for a library function. Hence, the defined codes are treated as authorised values. The operations of all library functions depend on the library authority parameters[2]. Library parameters become the fundamental component to be described along with bibliographic, holding and user data. Accordingly, Michelson[3] brings a notice that library parameters may be considered under authority control. The missing or unauthorised values will be the source of the malfunction of library operations. The library operations are managed by the use of parameters handled by an integrated library system (ILS). In this prospect, the ILS should ensure the availability of valid values for library parameters. A defined set of system characteristics of the ILS ensure the acceptance and maintenance of authorised values in the ILS.

The validity of the data depends on the characteristics of input. The libraries are absorbing the alternating characteristics of the input to store the values in the ILS for library parameters. However, they do not know which input environment is conducive to accepting and maintaining only valid values for library parameters in the database. With a similar scenario, the library of the University of

Jaffna, Sri Lanka employed library systems to store the values for mandatory authority parameters without considering any strategies for setting characteristics of the input. The library employed two different library systems in two different seasons for the library operations. The study measured the validity of the values represented in each system for the mandatory authority parameters to determine how a characteristic of the input set in a library system influences the validity of the respective value.

The characteristics of input that were represented in each library system employed by the University of Jaffna were assessed in the study. Further, the validity of the values representing the mandator parameters stored in the library systems was measured. The validity of the values was analysed against the characteristics of the input to determine the influence of a characteristic of input on the validity of a library mandatory parameter. Accordingly, the study identifies the required characteristics and techniques to accept and maintain valid authorised values for library parameters in the database.

Review of literature

The studies on measuring valid values of system parameters and finding the impact of the characteristics of input on the validity of values with the same scope as this study were not widely undertaken in the field of library and information sciences. The study conducted by Yun and Chaoying[1] was undertaken in the field of managing library parameters. Further, Yun and Chaoying[1] categorises the library parameters into three; module, permission, and authority. However, the category "authority parameter" is also considered in this study. The same study by Yun and Chaoying[1] notified that the authority parameters were monitored using authority control. In this scenario, Yun and Chaoying[1] calls the values of the library parameters as authorised values. Mandal[4] defines authority control and explains the use of the same in the library. Bearman[2] discusses the issues and prospects of authority control and notifies that authority control becomes an essential aspect of library operation. The same research discusses authority control for the subject terms. However, the paper does not fail to discuss authority control for the values of library authority parameters. The article includes a discussion about the authorised values for the type of materials and the administrative parameters. However, this research covers studies on a few more distinct library parameters.

A few more studies were identified with a discussion on authorised values. Bakar and Mansor[5] mention that verifying authorised values was made using a plugin installed in a library system. Handling the authorised values for library parameters was also identified as a challenge in the study. Avery[6,] Alansary, Nagi[7] point out how the authorised values should be handled in a study design. In particular, Dasgupta and Gupta[8] discuss how authorised values can be set up for the contributors such as editor, translator, producer, compiler, etc. Further, Kalita and Deka[9] explain how the functions of authorised values facilitated collocations. Moreover, the experience of creating and reviewing authorised values is shared by Lopez[10]. Matthews[11] discussed how a set of authorised values were handled when a library imported data elements from other sources into the library system. Two articles authored by Singh and Sanaman[12] and Ahammad[13] discussed the use of authorised values.

A collection of authority data is indexed and disseminated to supply a valid naming for the heading used in bibliographic descriptions. Several studies were conducted with the concept of authority data. The authors discuss the access, collecting, and validating of the authority data. Latif, Borst[14,] Prebor[15] discuss the access of the authority data made possible by linking through non-library community platforms like WikiData, Dbpedia, and ORCID. At the same time, Latif, Borst[16] introduced an author page which collects personal names not only from the repositories but also from other bibliographic databases. However, Yamada and Inoue[17] discussed, in particular, the collections of personal names related to Japanese historical materials while Provost and Nicolas[18] described the collection of secured linked publications to IdRef authority data for French Universities. Regarding validating the authority data, Lastochkina and Semenova[19] discussed improving the representation of authority data, Lee and Lee[20] made a study on the revision of KORMARC for the improvement of authority data, Lee[21] recorded mutual acceptance of national authority data of Korea, and Zavalina and Zavalin[22] reported the results of a case study on validation of authority data over time into acceptable form.

The concept of inputting data from a list of defined values for the library parameters was also taken in earlier studies. The list of defined values is also known as coded values. Catling, Spithourakis[23]

discussed the impact of using coded values as an input in the field of hospital management. Lindsay and Martin[24] notify that the application of coded lists is lesser in the field of health. The article advocates that free text entry into the data fields creates issues in generating reports, managing audits, conducting studies, and furthering the operations of an institution. Hogan and Wagner[25] studied the medication records which were entered in free text mode. They found that the free-text entry resulted in providing inaccuracy of data entered into the electronic medical records (EMRs) systems.

The studies were identified with the concepts of library parameters, authority control, authorised values and data, and corded values as related to the current study. The literature on the scope of managing the data representing the institution's authorised details is found in the field of library and information sciences and others. However, the current study has the scope of identifying the characteristics of input needed for storing valid values for the library parameters.

Methodology

The validity of the values that represented the authority parameters in an ILS and the characteristics of input that corresponded to the validity was assessed in the study. The assessments were made on two ILSs employed by the University of Jaffna, Sri Lanka. The Library of the University of Jaffna is serving undergraduate and postgraduate students by organising more than 200 thousand library materials. The library has seven branches located in various places in the Northern province of Sri Lanka. Since 2004, the library has employed two integrated library management systems for library operations one after another. The first system was used up to December 2018 and later the second was immediately absorbed and is now employed by the library.

All library parameters that were available in both systems were undertaken for the assessments. Further, the values representing the library parameters in the records exiting systems 1 and 2 were identified as the secondary data for the research. Non-probability sampling technique was used in the study. The total population of the records was considered as a sample for the study. Moreover, there were two clusters representing each system under the total population. A total of 2703 reader records and 114,469 bibliographic and holding records were available in system 1, which consisted of the values that were representing the authority parameters. System 2 was absorbed as a new platform by the library in place of system 1. Further, the records retained in system 1 were migrated into system 2.

After migrations, system 2 was fully employed by the library for its regular library management in December 2018. Since system 2 was used by the library, 11,340 reader records and 7625 bibliographic and holding records were freshly entered into system 2. Accordingly, 2703 values of parameters from reader records, and 114,469 from bibliographic and holding records were available for the study from system 1. Similarly, 11,340 values of parameters from reader records and 7625 from bibliographic and holding records were available from system 2.

The concerned two ILSs were assessed to identify the existing library parameters and the corresponding system characteristics of input in which they were managed. The distinguished library parameters considered in the designs of the systems were surveyed and listed. The values of the authority parameters were collected from the system for verifying their validity against the characteristics of the input. The validity of data was verified against the correct values authorised by the library. The number of valid (authorised), invalid (unauthorised), and missing values were counted separately. The counted values were represented in a table against each identified library parameter. The percentage of authorised, unauthorised, and missing values of mandatory library parameters was determined against the total number of records identified in each system.

The assessments on the characteristics of input concerning each library parameter and collecting their respective values were made in December 2018 and August 2021 respectively from systems 1 and 2.

Results

Four distinguishing characteristics of input were identified from the assessment of the systems. The values for library parameters were inputted into the library system using either specific or common data fields (attributes). Further, coded and free fields were available in the library systems to feed the data into the database. The coded field enabled the user only to pick up data from a predefined list of values (LOV) while a free field to type and enter the data freely. In addition to this, the requirement of data for a field was restricted as mandatory or sometimes optional. Those characteristics can be represented as discrete-binary nature; “separate or common attributes used for

storing data", "pick up list (coded) or free text for inputting values", "data required or optional to the field" and "the parameter used or excluded by the library". Since the variables for the characteristics of input had discrete-binary nature, The assessment of the system was recorded using the binary values 1 (TRUE) and 0 (FALSE), refer to Table 1. The TRUE conditions for the assessments were "Separate attribute is available (A)", "Coded-field type is used (C)", "The field is mandatory (M)", and "Parameter is used in the system (U)". If a system meets the condition, the value 1 is given in the assessment, otherwise 0. Assessments were separately done for each system considered in the study. All measured assessments are represented against identified library parameters in Table 1. The four TRUE characteristics are noted for simplicity as "Separate attribute", Coded, Mandatory, and Used.

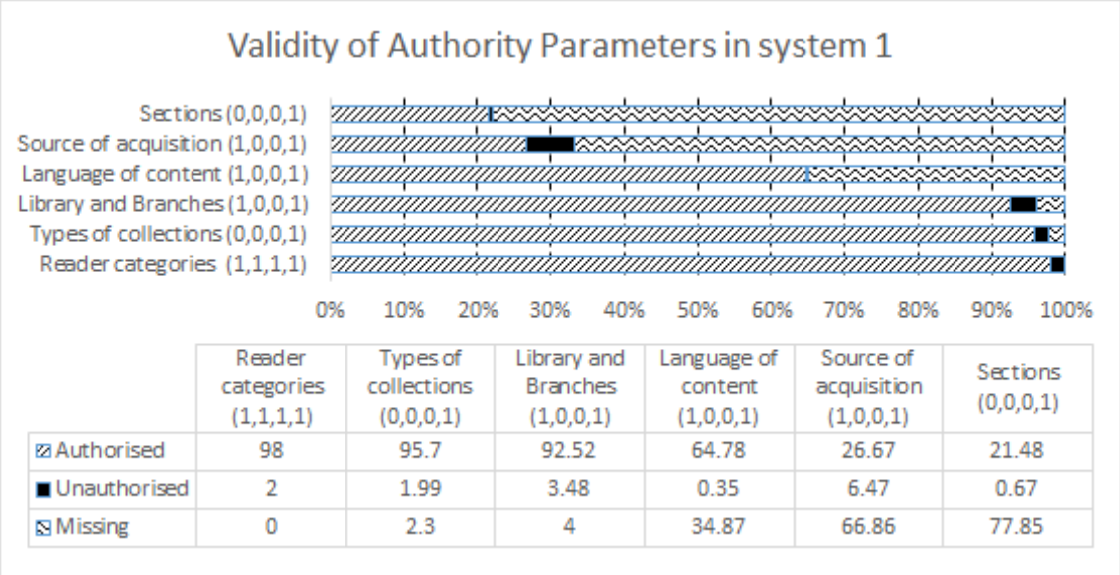
Twenty unique library parameters were identified as existing in the system design, which may be identified in both systems or either system 1 or 2. Out of 20 parameters, the first seven (1 to 7) were used in both systems. However, the other four parameters (8 to 11) were used in system 2 in addition to the seven parameters used in both systems. The rest nine parameters (12 to 20) were not used either in systems 1 or 2, refer to Table 1. The first seven authority parameters shown in Table 1 such as *Reader categories*, *Type of collection*, *Library and Branches*, *Language of content*, *Source of acquisition*, Sections, and *type of accompanying material* were used in both systems 1 and 2. Few additional authority parameters were found as being used in system 2 compared to system 1. *Accompanying materials*, *Type of document*, *Lost status*, *Withdrawn status*, and *Damage status of materials* are among them. Altogether 11 authority parameters were used in system 2. Out of these used parameters, the *Reader categories* were identified in the reader records, and the rest were in the bibliographic and holdings records. These recorded binary values in Table 1 corresponding to a parameter are the coordinates of the characteristic that influence the acceptance and maintenance of the authorised values for the same parameter.

Table 1 — Characteristics of input identified in systems 1 and 2 for the library parameters.

No.	Description of Authority Parameter	System 1				System 2			
		A	C	M	U	A	C	M	U
1	Library and Branches	1	0	0	1	1	1	1	1
2	Source of acquisition	1	0	0	1	1	1	1	1
3	Type of collection	0	0	0	1	1	1	1	1
4	Language of content	1	0	0	1	1	1	0	1
5	Shelving location	0	0	0	1	1	1	0	1
6	Reader categories	1	1	1	1	1	1	1	1
7	Accompanying materials	0	0	0	1	1	1	0	1
8	Type of document	1	0	0	0	1	1	1	1
9	Lost status	0	0	0	0	1	1	0	1
10	Withdrawn status	0	0	0	0	1	1	0	1
11	Damage status of materials	0	0	0	0	1	1	0	1
12	Acquisition Status Designator	0	0	0	0	1	1	0	0
13	Budgets	1	0	0	0	1	1	1	0
14	Funds	0	0	0	0	1	1	1	0
15	Format of the document	0	0	0	0	1	0	0	0
16	Physical Form Designators	0	0	0	0	1	1	0	0
17	Content-type	0	0	0	0	1	0	0	0
18	Content Audience	0	0	0	0	1	0	0	0
19	Conservation methods	0	0	0	0	1	1	0	0
20	Types of media conversion	0	0	0	0	1	1	0	0

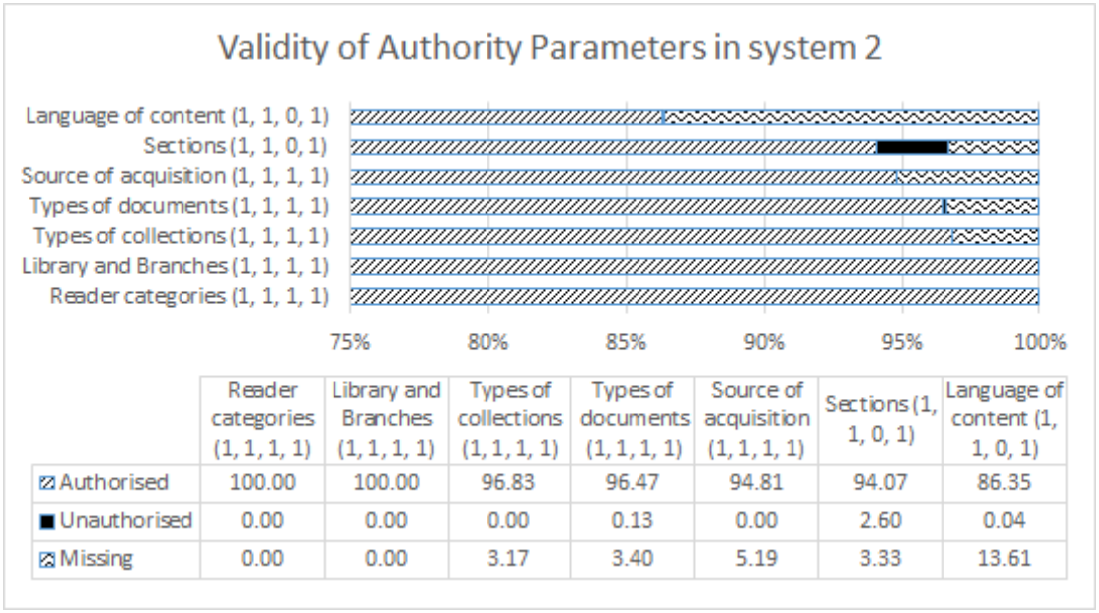
In addition to the above results found from the assessment of the systems, another set of results was also found by measuring the validity of data representing the authority parameters in the systems. The measurement of validity should be generalised before analysing them. However, the measurement of validity corresponding to a few authority parameters could not be generalised to the total number of records. The four authority parameters, such as *Accompanying material, Lost status, Withdrawn status,* and *Damage status,* were not always available in the bibliographic or holding descriptions of the library materials. Hence, they cannot be considered in the generalization of the total number of records. Other than these four authority parameters, the rest 7 are mandatory for the descriptions of the library materials or readers. Therefore, the number of data representing these seven authority parameters can be generalised to the total number of records undertaken in the study. Accordingly, the 7 parameters such as *Library and Branches*, *Source of acquisition*, *Type of collection*, *Language of content*, *Shelving location*, *Reader categories*, *Accompanying materials*, and *Type of document* were considered in the assessment of validity.

The data originally representing these authority parameters were verified for having authorised, unauthorised, and missing values. The percentage of the number of verified data for authorised, unauthorised, and missing values against the total number of records are shown in Figs 1 and 2, respectively, for systems 1 and 2. The binary values of A, C, M and U used in the assessments are also



	Reader categories (1,1,1,1)	Types of collections (0,0,0,1)	Library and Branches (1,0,0,1)	Language of content (1,0,0,1)	Source of acquisition (1,0,0,1)	Sections (0,0,0,1)
Authorised	98	95.7	92.52	64.78	26.67	21.48
Unauthorised	2	1.99	3.48	0.35	6.47	0.67
Missing	0	2.3	4	34.87	66.86	77.85

Fig. 1 — The validity of values, representing the authority parameters in system 1, in percentage against the total number of records



	Reader categories (1, 1, 1, 1)	Library and Branches (1, 1, 1, 1)	Types of collections (1, 1, 1, 1)	Types of documents (1, 1, 1, 1)	Source of acquisition (1, 1, 1, 1)	Sections (1, 1, 0, 1)	Language of content (1, 1, 0, 1)
Authorised	100.00	100.00	96.83	96.47	94.81	94.07	86.35
Unauthorised	0.00	0.00	0.00	0.13	0.00	2.60	0.04
Missing	0.00	0.00	3.17	3.40	5.19	3.33	13.61

Fig. 2—The validity of values, representing the authority parameters in system 2, in percentage against the total number of records

represented for each authority parameter as a bracketed coordinate value in Figs. 1 and 2 respectively for systems 1 and 2. The bracketed coordinate value represents the characteristics of the input.

Discussion

The values represented for the *Reader categories*, and *Library and Branches* become fully authorised (100%) in system 2, refer to Table 1. At the same time, the values represented for the *Reader categories* in system 1 are authorised in 98%. The coordinate representing the characteristics of input for these three data fields becomes (1,1,1,1). The first three coordinate values become TRUE, which expresses that the input data for authority parameters was fed into the system with three characteristics such as *separate attribute*, *coded* and *mandatory*. The same characteristics of input with coordinate values (1,1,1,1) were available in system 2 for accepting the input values for the authority parameters *Type of collection*, *Type of document*, and *Source of acquisition*. The values represented those parameters were authorised in 96.83, 96.47, and 94.81 % respectively. Accordingly, it is observed that the

system design with the coordinate value (1,1,1,1) supports maintaining more than or equal to 95 % of authorised values for a mandatory library parameter. The first TRUE value represents that the input fields used to accept the values for each mandatory library parameter should be distinct. Alternatively expressing that the input data representing the parameter value should be managed in a discrete attribute in the database to retain the unique values for each parameter. Further, the second and third TRUE values represent that the input file should be coded and mandatory for data entry. However, one contradictory observation is made that the input field with the coordinate value (0,0,0,1) is also supported for keeping more than 95% of values as authorised for the *Type of collection* in system 1.

It says that the input field with neither a separate attribute, coded nor mandatory, can ensure the authority values for the library parameters. The identified reason for thisn observation is that the values represented by the parameter *Type of collection* are required for a routine library activity. The activity of printing spine labels for the library materials depends on the value represented by the parameter *Type of collection*. At the same time, all library materials should be stamped with the spine labels before shelving them in the library sections just after completing the data entry work for them. Therefore, printing and pasting spine labels to the library materials became the primary routine activity in the library. Hence, the library kept the parameter value for the *Type of collection* as becoming authorised in the system.

A similar observation is made in system 1 that the input field with a characteristic (1,0,0,1), free from coded and mandatory restriction, also supported drawing a good percentage (92.52 %) of authorised values for the library parameter of a *Library and Branches*. The reason for this phenomenon is also the same as described for the parameter *Type of collection*. Hence, the immediate need for an authority parameter to complete a routine library activity also influences keeping values of the parameters authorised.

Another observation was made from system 2 that the design with coordinate (1,1,1,1) does not fully ensure the validity of the value representing the authority parameter. Values representing the authority parameters *type of collection*, *type of document*, and *Source of acquisition* in system 2 with design coordinate (1,1,1,1) were not authorised with 100%, however, respectively with 96.83, 94.47, and 94.81 %. According to Fig. 2, missing data is the source of deviation. This phenomenon contradictorily says that the input field does not have a mandatory setting to accept the data into the system. The reason for the phenomenon was the respective fields were not set as mandatory when the library absorbed system 2 for operations; however, it was set later after revising the requirement of system design. Another reason was that the pickup list consisted of unauthorised values for the selections. Hence, the parameters identified as a mandatory element for describing library records should be set as a required field at the beginning of utilising the system. Further, it should not be relaxed later to always ensure the availability of authorised values and avoid missing data in the record descriptions. Further, coded values for library parameters should not accommodate additional unnecessary entities among the list of values.

Only 21.48% and 26.67% of values, representing the parameters *Shelving location* and *Source of acquisition*, were found as authorised in System 1. Further, many of the values representing them were missing respectively in 77.85% and 66.86%, refer to Fig. 1. However, both parameters became the primary entities for many library functions and services. The parameter *Shelving location* is the entity for shelving and reshelving, searching based on location, displaying virtual shelve, issuing and returning the books, and reporting. At the same time, the source of the acquisition is for budgeting and reporting. According to the assessment, the input fields of those parameters were not set as mandatory and coded in system 1. Hence, the input values for all mandatory parameters must be set mandatory in the system design to avoid blank data in the library system. The condition for this setting is that the respective field should be represented by a separate attribute.

The validity of the values represented for the mandatory authority parameters such as *Reader categories* and *Library and Branches, Type of collection*, *Type of document*, and *Source of the acquisition* in system 2 was authorised with more than 94%. At the same time, the validity of the values represented for *Reader categories* in system 1 was authorised in 98%. In both cases, the characteristics of the input were customized with all four TRUE values of characteristics namely *separate attribute*, *coded*, *mandatory* and *used*. System 2 was identified with

many input fields that were customised with all four TRUE values of characteristics compared to system 1. Hence, system 2 best performed than system 1 in storing the valid values for mandatory authority parameters. Further, the validity of values was observed as generally declining when the characteristics of the input were customized with only three or lesser TRUE values in either system 1 or 2. Hence, the characteristics of input should be customised in systems 1 and 2 employed by a single library setup at the University of Jaffna with the condition that the *parameter should be used* in the systems with a *separate attribute*, the input data should be selected from a *mandatory field* with a *list of values* to store the valid data for mandatory authority parameters.

Further, while a field is set to become coded and mandatory, the value for an authority parameter will be selected only from a list of values. Here, the requirement is that the list of values should be updated while employing the new parameters to enable the availability of the required data from the pickup list for data entering. However, the used list of values representing an authority parameter should not be changed as alternates from time to time. This is a conditional requirement for keeping the input field coded and mandatory.

Conclusion

The input characteristics of an ILS influence keeping the parameter values become authorised in the database. The characteristics of input take binary nature such that storing data for a library parameter may be from a separate or common attribute, the inputting values may be selected from a pickup list (coded) or freely typed, the requirement of data to a field may or may not be restricted, and a parameter available in the system may or may not be used by the library. One of the needed characteristics of input is that the database design should enable a separate attribute to accept and store the input values for each library parameter. The database designers and library administrators should facilitate the data entries with the availability of a list of values defined by the library for inputting data. The system should enable the input field to be mandatory to avoid the possibility of leaving blank data for a mandatory library parameter. Such identified characteristics of input support entertaining the values for library parameters authorised in the database.

The customization of characteristics of input in system 2 was found as more suitable compared to system 1. Further, systematic system management and timely support will retain the required characteristics of input on hold. The predefined list of values for the library parameters should be immediately enriched with the new value(s) before the requirements of the same during data entries. Further, the defined value should not be changed into another for the same library parameter. Moreover, the defined list should be verified and confirmed for not listing unauthorised values among authorised ones from the beginning of the system design and later. The field used for accepting the input values for the mandatory library parameter should be set to mandatory before a library starts using the same field for its operation, and it should not be relaxed during all times of use. In certain cases, the immediate need for library parameters for a routine library activity also involves making the parameter values authorised.

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