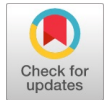# A Knowledge Management Model to Improve Strategic Planning and Decision Making in HEIs

Subhashini Sailesh Bhaskaran

Abstract: Knowledge management practices in Higher education institutions can lead to better decision making, better curriculum development, and research, enhanced academic and administrative services and better utilisation of resources (Kidwell et al., 2000) [6]. Moreover, advancements in the field of Data Mining and big data science have opened up significant opportunities for these institutions to create, manage, protect, and disseminate knowledge effectively. This paper presents a knowledge management model designed to enhance research processes, teaching and learning processes, student and alumni services, administrative services and processes, as well as strategic planning and management. This paper uses data mining and big data science techniques to unearth the knowledge hidden in student information systems to enable improved HEIs management and progress.

Keywords: Strategic, Making, knowledge, learning processes, planning, HEIs

I. INTRODUCTION

Higher Education Institutions (HEIs) play a significant role in the information-based economy. As learning organizations, they will have the option to broaden information aptitudes, produce top quality alumni, upgrade advancement and imagination and contribute adequately to the information creation and protected innovation improvement (Kok, A., 2007) [7], (Abdullah et al. ,2005) [1]. The expansion of information resources is itself a seed of higher education, contributing to the eventual outcomes of financial and social improvement. Indeed, Knowledge Management (KM) is gaining acknowledgment in the scholastic segment over the most recent couple of years, when it becomes clear that colleges have a significant role to play in the information economy, bringing new difficulties for HEIs (Abdullah et al.,2005) [1], (Bhusry and Ranjan, 2011) [3], (Sedziuvienna and Vveinhardt, 2009).

According to a few authors (Sedziuvienna and Vveinhardt, 2009), (Hoveida and Hooshmand, 2008) [5], we can recognize two viewpoints of information in HEIs: I) scholarly information, coming about because of learning and educating exercises, the central role of colleges; ii) hierarchical information, which alludes to information on the general business of an establishment: its qualities, shortcomings, systems, basic factor of achievement, associations with inquire about focuses, and so forth.

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These two points of view of information could be improved by a lot of KM practices and instruments that encourage the advancement of a condition of information creation, coordinated effort and sharing (Bhusry and Ranjan, 2011) [3], (Alavi and Lediner, 2001) [2]. Due to the presence of new information makers in HEIs, an increasing number of colleges are investigating the feasibility of applying corporate tools. Advancements are critical to encourage KM exercises, for example, discovery or acquisition (exploration), broadcasting or sharing (instruction), using good information and its safeguarding (libraries, storehouses) (Maponya, 2005) [8], (Bhusry and Ranjan, 2011) [3], (Pinto, 2013) [10]. Then again, these issues miss their significance if the foundation doesn't have a methodology and a set of institutional practices which lead to making, sharing and teaming up between the different entertainers over the association (Maponya, 2005) [8], (Alavi and Lediner, 2001) [2]. In this research, the authors discusses about the idea of information the executives in HEI, trailed by a systematization of information practices and apparatuses to connecting the few on-screen characters (students, instructors, scientists, secretariat staff, outside elements), and advancing the information sharing over a few key procedures and administrations in a HEI, for example, the exploration forms, learning procedures, understudy and graduated class administrations, authoritative administrations and forms, and key arranging furthermore, the board. The paper likewise presents and talks about a system to improve information sharing and cooperation in a HEI, and then finishes by showing an instance of strategic planning and decision making using student complaints data, using data mining.

II. KNOWLEDGE MANAGEMENT IN HEI

KM is turning into a significant issue in higher education, which drives the capacity of gathering and dissecting data, changing information and applying oddities (Bhusry and Ranjan, 2011) [3]. It is essential to call attention to the significant information, make a philosophy for accepting and combining information, to perform the spread of information among the students and staff, and to produce new information and development through information sharing (Sedziuvienna and Vveinhardt, 2009), (Santos and Wane, 2013) [13]. Bloch (Santos and Wane, 2013) [13] contends that information has become a key vital asset, essential to thriving and intensity. HEI will encounter strengthened weight, impacted by the information economy and the globalization, with progressively interconnected substances and where information, inventiveness and advancement are the basic components for seriousness (Cranfield and Taylor, 2008) [4]. Kidwell et al.

(Kidwell et al. 2000) [6] contend that KM is essential to HEI, bringing significant advantages to instructive foundation procedures, for example, inquire about, educational plan improvement, understudy and graduated class administrations, authoritative administrations and key arranging. The test converts the information currently residing in each individual or administration and makes it generally and effectively accessible to all employees, staff members, and other stakeholders. Bushry and Ranjan (Bhusry and Ranjan, 2011) [3] pointed out that the principal challenge in HEI is to create an information condition, and the acknowledgement of information as scholarly capital. Viable KM requires significant changes in the way of life and qualities, as well as in organisational structures, practices, and systems. Moreover, a few investigations uncover the incipient idea of KM in HEI and the critical need to receive data advancements that address the necessities of the activities and practices (Bhusry and Ranjan, 2011) [3], (Ramakrishnana and Yasin, 2012) [11], (Lindval and Sinha, 2003).

Over the most recent years, critical work has been done in the field of KM in HEI, centring on practices, devices, activities, assets and systems to oversee hierarchical information, expanding its dispersal and its utilization (Abdullah et al.,2005) [1], (Bhusry and Ranjan, 2011) [3], (Sedziuvienna and Vveinhardt, 2009), (Ranjan and Khalil, 2007) [12], (Suciu, Piciorus and Imbrisca, 2012) [14]. A few systems have been developed to improve KM in HEIs. These systems centre on an assortment of points of view, as indicated by a short writing survey (Bhusry and Ranjan, 2011) [3], (Sedziuvienna and Vveinhardt, 2009), (Kidwell et al., 2000) [6], (Ranjan and Khalil, 2007). A few authors focus on implementing data frameworks. In contrast, others refer to informal organisations, information practices, workflow frameworks, or organisational strategies to manage the creation and transmission of structured and unstructured data. Then again, these structures contain numerous information processing procedures to help, enhance information processes, and provide resources. (Sedziuvienna and Vveinhardt, 2009) incorporate the information procedures of recognisable proof, creation, storage, and sharing of information into their system. (Alavi and Lediner, 2001)[2] allude to information creation, capacity/retrievel, information move and application. The European Guide for Good Practice in KM refers to the information procedures for creation, storage, distribution, and use, as well as those of other authors. In any case, it ought to be noticed that ongoing approaches point that information is indistinguishable from its holders, its advancement speaks to a consistent procedure dependent on the schedules and exercises embraced by people (Santos and Wane, 2013) [13]. The creation and sharing of information includes social collaboration, personal correspondence, and coordinated effort (Bhusry and Ranjan, 2011) [3].

For the most part, these procedures involve getting the hang of things, watching the forms (learning by doing), committing gradually, and social connection. Right now, it is naturally connected with

ideas, for example, constant learning, development, correspondence, cooperation, and culture of sharing (Santos and Wane, 2013) [13], (Nonaka and Kono, 1998) [9].

Agreeing with a few authors (Kok, A., 2007) [7], (Sedziuvienna and Vveinhardt, 2009), (Van, 2013) [15], HEI have numerous particularities and specificities, which ought to be taken into consideration, since they sway the information the board issues:

- An enormous number of students, with various objectives, extraordinary interests and heterogeneous profiles. The massification of higher education and the expanding versatility of students in trade programs underscored this heterogeneity.
- Students from various nations, with unmistakable societies, dialects and aptitudes;
- The diverse range of preparation offers, with a few courses that try to create skills and abilities in various fields;
- The requirement for students to partake in look into, improvement and advancement forms, and the emphasis on educating and learning for new students and learning for new objectives;

This heterogeneous and logical nature, which is found in real higher education, presents various difficulties in informing executives at the HEI. To address these difficulties, a wide assortment of information management practices has been proposed by analysts and experts to improve the forms mentioned previously. These practices may be viewed as an organised arrangement of exercises that contribute to KM, supported by mechanical devices, also known as information management frameworks.

Utilising information, executives' procedures, and advancements in higher education is as essential as it is in the corporate division. Whenever done adequately, it can prompt better decision-making capabilities, "item" advancement process duration (for example, educational program advancement and research), improved scholastic and administrative services, and decreased expenses.

Depending on the institutional information of new people, it can hamper the adaptability and responsiveness of any association. The test is to change over the data that currently resides in

those people and make it generally and effectively accessible to any employee, staff member, or other constituent. An institution-wide approach to managing information can lead to exponential improvements in sharing information, both explicit and implicit. Kidwell et al. (Kidwell et al. 2000) [6] has listed how application of knowledge management could help a number of university processes and services: the research process, curriculum development process, student and alumni services, administrative services, and strategic planning.

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Table 1: Application of KM in HEI and its benefits (adapted from Kidwell et al. 2000) [6]

KM for Students and Alumni	
• Portal for student services, providing information for both students and faculty and staff at the institution, so that they are well-informed to advise students. • Portal for employment services • Information on student affairs services for faculty and staff to ensure all understand existing services and can provide proper advising. • Portal for alumni and development services to minimize redundant efforts; capture contact reports; and link to research, curriculum, and career development efforts. • Portal for information on outreach constituents to integrate efforts and minimize redundant efforts.	**Benefits** • Enhanced services for students. • Enhanced service capability of faculty and staff. • Enhanced services for alumni and other external constituents. • Enhanced effectiveness and efficiency of advising efforts
KM for Administrative Services • Portal for monetary services • Portal for procurement • Portal for human resources	**Benefits** Improved effectiveness and efficiency of administrative services. • Enhanced ability to identify improvement efforts. • Improved ability to support the trend toward decentralisation (for example, local business centres) by providing guidelines for consistency. • Improved compliance with administrative policies such as procurement, preferred vendors, procurement card policies, budgeting procedures, affirmative action guidelines, and so forth. • Improved responsiveness and communication capabilities

This research paper focuses on applying knowledge management to student administrative services to improve efficiency and effectiveness.

III. STRATEGIC PLANNING AND CRM IN HEIS

A. Strategic Planning:

Introduction of knowledge management into an HEI is a strategic issue, and therefore permits a proper strategic plan. This plan must include a Customer Relationship Management (CRM) function, as well as other supporting purposes and procedures. The supportive functions and processes must also be advanced or supported for the possible of knowledge-based CRM to be fully realized. Adopting knowledge management also requires a strategic review of the enterprise business model to deduce its effects and challenges of implementation. Viewing knowledge management solely on an operational level would be insufficient, as it encompasses issues of change management, corporate culture, leadership, and competency development, all of which have a significant impact on the business model and competitiveness of the enterprise. The strategic planning process includes the following steps: 1. situation analysis; 2. scenario planning; 3. strategic options; 4. implementation; 5. performance management; and 6. review and adjustment.

B. Customer Relationship Management (CRM):

Regardless of the numerous investigations that have been done, especially in west (Bose andSugumaran, 2003; Brenner et al., 2005; Campbell, 2001; Gibbert et al., 2002; Stefanouet al., 2003), relationship between Knowledge Management (KM) and Customer Relationship Management (CRM), none

of them are complete enough to catch all the variables into one single system. As indicated by Bose and Sugumaran (2003), genuine CRM can be achieved uniquely through the integration of KM, which results in improved business processes and enables firms to gain a good understanding of their customers' levels of 'fulfilment, productivity and devotion'. They also pinpoint the absence of a general and straightforward structure for incorporating CRM functionalities with knowledge management capabilities (Bose and Sugumaran, 2003). Today, the current test for associations is to develop a comprehensive CRM platform. This stage enables organisations to gather relevant information about customers from existing customer interactions. Despite organisations collecting a tremendous amount of information about their clients, including their social activities, they still lack knowledge on how to manage and utilise this information to its full potential (Campbell, 2001). Blast et al. (2005) recognise that effective CRM requires profound knowledge of customers (Knowledge Management); however, how these two types of innovation fit together needs examination. Additionally, past investigations attempting to integrate KM and CRM have been constrained in scope, and common methodological limitations or errors have influenced their outcomes. A significant number of the past examinations have utilized subjective strategies (for example, case studies, literature survey) (for instance, see Gibbert et al., 2002; Brenner et al., 2005; Campbell,2001; Halinen and Rollins, 2005;

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Gao and Li (2006) close their exploration findings, and some other studies have utilised convincing insights (for instance, Stefanou et al., 2003). Consequently, to overcome any barriers and provide associations with assistance in managing the board's perspectives on the impact of KM on CRM performance, this paper proposes several key KM factors. It develops a proposed model to illustrate the relationship between key KM components and CRM.

The primary purpose of CRM is to monitor clients' behaviour for a better understanding of their ever-changing needs and preferences. By planning and utilising this information, the association can provide predominant assistance to clients and logically improve this quality by communicating with them through various channels. In view of what organizations have learned about their clients through numerous channels and various offices, for example, promoting, deals and so forth., they ought to have the option to treat every individual customer differently and conveying items and administrations alongside supporting data inorder to address their particular needs and issues (Bose and Sugumaran, 2003; Mithas et al., 2005; Peppers et al., 1999).

CRM can be characterised as a hierarchical, wide-ranging methodology to transform an association into a client-driven one by securing chosen key clients and developing and maintaining long-term beneficial relationships with them. This long term relationship will be engaged by utilization of their insight and data which as its ultimate reason, it improves client service and builds association's revenue and benefit (Buttle 2001; Could-well 1999; Gosney and Boehm 2000; Kim et al., 2003; Parvitiyar and Sheth 2001; Payne and Frow, 2005; Singh and Agrawal 2003). CRM is one of the most significant segments among authoritative procedures due to its capacity to recognise clients, initiate information, establish relationships with them, and demonstrate their knowledge about the organisation and its products (Llamas and Sule, 2004). Moreover, CRM encourages associations to modify their products and services, simultaneously enhancing quality to provide greater value for clients and increase client retention by attracting and retaining significant and productive clients, while also recognising and appreciating the invaluable ones (Kim et al., 2003; Romano and Fjermestad, 2003). As per Payne and Frow (2005), the way that associations characterize the CRM unequivocally influences the method of CRM acknowledgment and practice in associations and one of the most dangerous choices that associations can make in regards to CRM execution is installation of CRM before production of a client centered condition in organization or different words, before changing themselves to a client centric organization (Rigby et al., 2002).CRM is an administrative approach that associations use to distinguish and develop in-depth information about their clients' practices and preferences. At long last, they adopt systems and create programs to foster and maintain successful relationships with their clients, thereby retaining and attracting profitable customers (Parvatiyar and Sheth, 2001; Stefanou et al., 2003). In this way, the primary focus of CRM is on building up and continuing a "devoted and stable client base" through the provision of outstanding support to clients, supporting them and offering products based on their requests. Ultimately, as a definitive outcome of the CRM initiative, organisations can measure the degree of consumer loyalty and the value of their relationships with clients (Halinen and Rollins, 2005).

In HEIs, customers are students. In the literature, there is a greater emphasis on curriculum development, strategic planning, and other related areas. The services offered to students by faculty and administrative staff are less researched in terms of knowledge management. Further CRM in HEIs is still under-researched, and KM with CRM in HEIs has a lot of potential for unearthing strategic planning and decision-making in HEIs. This strategic planning and decision-making is expected to favour students, enhancing the relationship with HEIs. This research is utilising CRM with KM of administrative and student services to facilitate strategic planning and decision-making in HEIs by investigating the student complaints/inquiry module data of a university.

IV. DATA MINING (DM) AS A KM TOOL

From the viewpoint of the KM process, DM appears as an instrument for knowledge creation. As such, the disclosure of new information and the concealed example of hierarchical recollections that are revealed through information creation is made possible with DM.DM can be depicted as a procedure that permits clients to recognise information structure, mathematical, scientific, artificial intelligence, and AI systems to separate and identify relevant data and suitable information from large databases (Lawal, Odeniyi, and Kayode, 2015). Silwattananusarn, furthermore, Tuamsuk (2012) portrays information mining as a stage in the information revelation process in databases that produces a reasonable plan or model from the information. The writing recommends numerous DM strategies as instruments for information creation from hierarchical information and recollections.

For the moment, association rule is perhaps the most refined data mining system, having been applied in various ventures that contain a substantial amount of information, such as retail, telemarketing, insurance fraud, and others. As indicated by past examinations, as referred to by Buttar and Kaur (2013), the affiliation rule can be considered a robust device for market analysis to explore the behaviour of clients, including what items they consistently purchase. Therefore, this information and data may be valuable for the chief in making a sound, informed decision. Association and classification rule disclosure are comparative; however, actual association rule revelation can identify any attribute in the data set, whereas classification involves forecasting only one attribute.

Classification focuses on data mining methods used for such purposes (Harshna and Navneet Kaur, 2013). Fayyad et al. (1996) defined classification as the process of discovering models that arrange data into different predefined classes. The classification task is described by well-defined courses and a further preparation set containing predefined models. Data mining is a remarkable innovation with incredible potential that can be utilised to extract hidden predictive data from large databases.

DM instruments predict future business patterns, enabling businesses to make proactive, data-driven decisions (Folorunso and Ogunde, 2004). Bora (2011) asserted that data mining can be a strategic tool for decision support, applicable in various areas, including marketing. Likewise, Ding (2010) also noted that DM can play a crucial role in enhancing the promotional decision in successful organisations. According to past investigations, as referred to by Ali and Bach (2014), DM has become increasingly well-known due to the contributions it can make in transforming data into information, which helps advertisers anticipate and make informed decisions about the best choice for advertising. In this way, it is often noted that DM is a specialised system or apparatus that can be utilised to transform data into information, making it dynamic to help an organisation or business achieve its business objectives and enhance its performance. The KM and DM are broadly applied in various aspects of human activities. Information mining has been established in multiple industries, including accounting, manufacturing, design, retail, and DNA analysis, among others (Ruhaizan, Zalinda, and Azuraliza, 2009). This research will utilise data mining as a knowledge discovery tool in the knowledge management of administrative and student services.
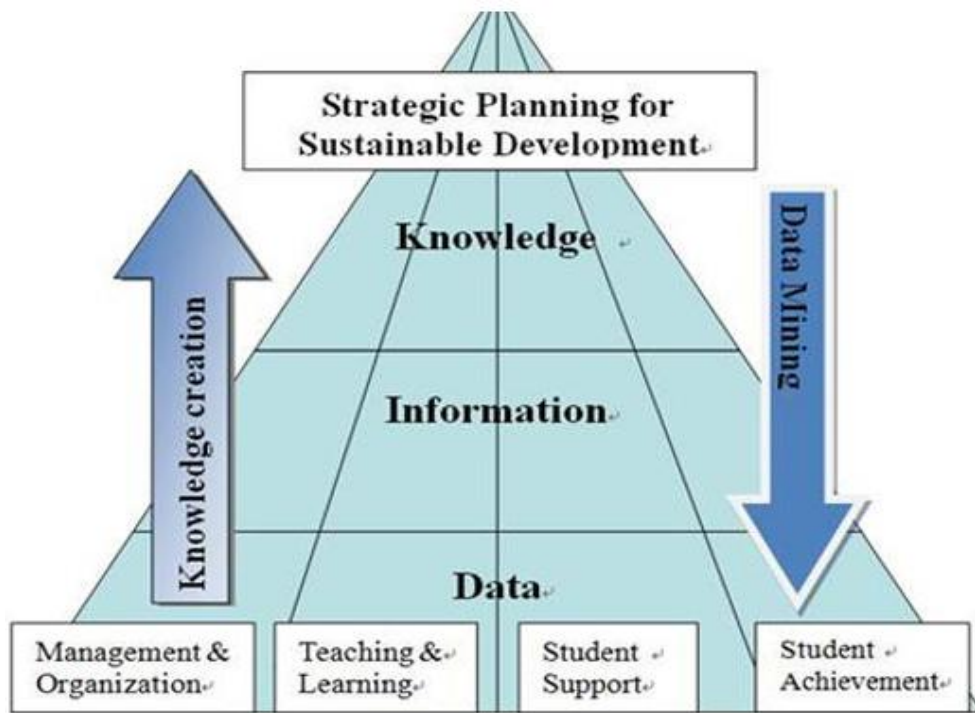

Fig. 1: Knowledge Management and Data Mining

V. KNOWLEDGE MANAGEMENT MODEL FOR STRATEGIC PLANNING AND DECISION MAKING- RESULTS AND DISCUSSION

A student complaint and enquiry module was introduced in the university's student information system in Bahrain. The purpose of this module is to enable students to raise their complaints, concerns, and enquiries about various services offered by the university, including those against staff and faculty. In this module, complaints and enquiries received from students are processed automatically through the system. Depending on the type, the case will be forwarded to the respective faculty or staff member for follow-up. After attending to the case, it is finally forwarded back to the officer for review and notification to the student through the system. In this research, the following dataset is retrieved from the system to analyse and uncover the hidden information present in the data, thereby understanding the complaints and enquiries that affect students the most and their reasons. This analysis would help identify and understand the pattern of complaints and enquiries, enabling corrective action and preventing future cases. Future cases could be prevented by making strategic decisions that may potentially enhance the university's reputation. By avoiding future cases, the relationship between the university and its students can improve, leading to increased student satisfaction. This, in turn, acts as indirect marketing for the university, thereby improving admission rates.

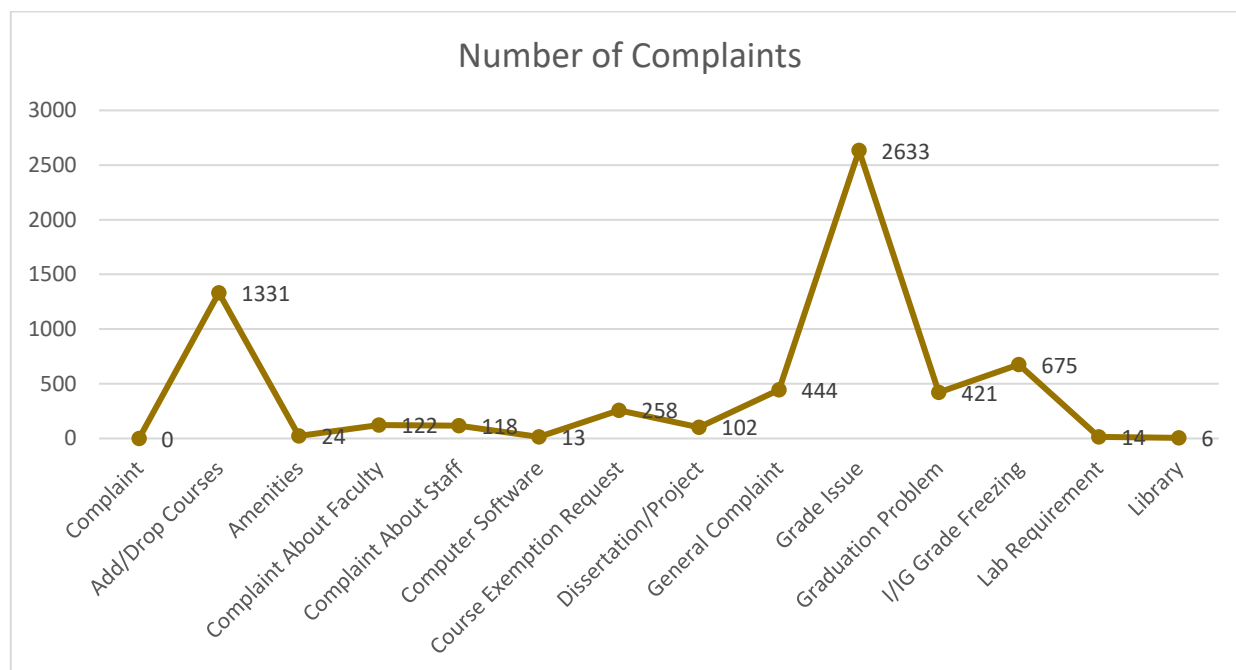| Field	Remarks
Complaint type	Types of complaints received from students
Programme	Programme of the student
Year of the student	The year in which the student is studying
Number of students	Number of students

A total of 6161 complaint records were processed.

Fig. 2: Data visualisation graph showing the distribution of complaints

The above data visualisation graph shows the distribution of complaints over different categories. This indicates that the Grade issue has the highest number of complaints, at around 2,633 cases, followed by Add/Drop courses with 1,331 cases. When the Apriori algorithm was applied to the data using association rules, it was found that there is a link between the year in which the student is studying and the type of complaint. However, grade issues and add/drop are the top complaints among all students for all years. In years 2 and 3, student attendance and tuition fees are other higher issues, while in year 4, tuition fees and other miscellaneous problems are present.

Table 2: Total Inquiry/Complaints by type

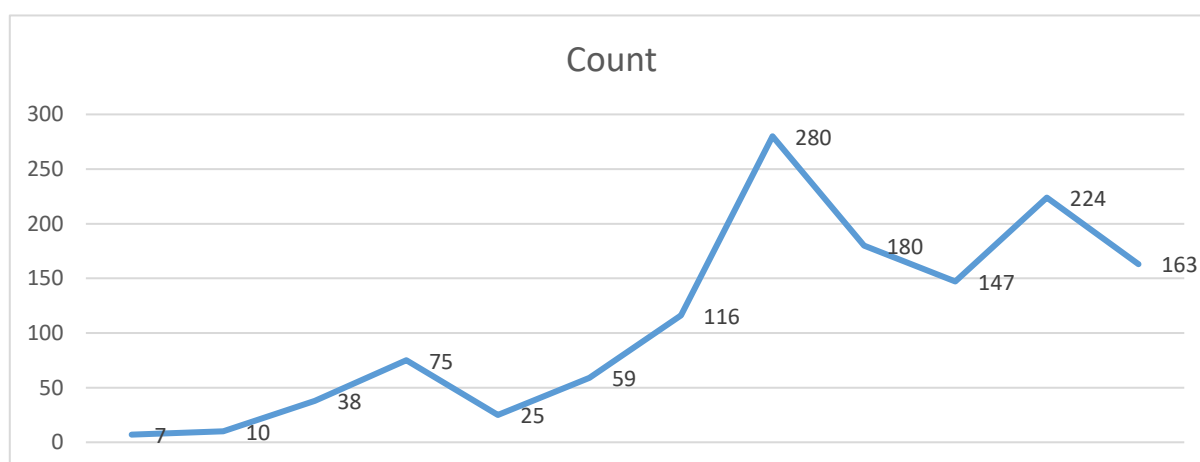| Year	Inquiry type	Count
1	Others	10
2	Graduation Problem	38
2	Others	75
2	Student Attendance	25
2	Tuition Fees	59
3	General Complaint	116
3	Others	280
3	Student Attendance	180
3	Tuition Fees	147
4	Others	224
4	Tuition Fees	163

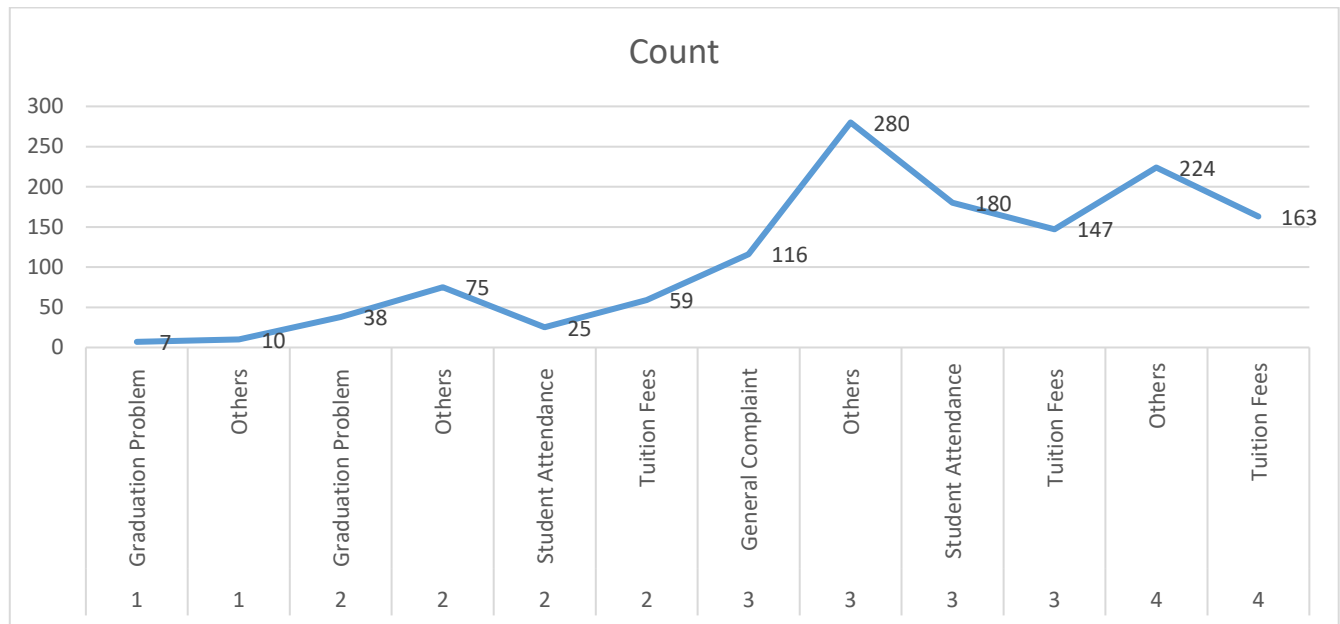**Fig. 3: Total Inquiry/Complaints by type**

Fig. 4: Total Inquiry/Complaints by type of issue

Furthermore, it was found that these issues and complaints are more prevalent among students in the sure programme. In certain degree programmes, specific types of complaints predominated. Complaints, such as add/drop, were more commonplace in BSID and BSMIS, but the Grade issue was more prevalent in BSBF and BSID programmes. Using Data Mining, new knowledge is created, indicating a link between the year of study of students in HEIs and the problems or issues they face. This knowledge enables the implementation of numerous corrective actions and strategic decisions that enhance the student's learning experience and foster a stronger relationship with the university. The departments with specific problems that occur in high numbers can be analysed in the department and college councils to take action that could reduce these issues. For instance, add/Drop issues that are high in certain programmes were investigated in depth to address the specific problems related to courses or faculties handling them, which are a significant source of add/drop issues and complaints. Furthermore, the tuition fees and grade issues affecting many students can be examined from both administrative and academic perspectives to reduce the number of students impacted by these issues. Certain strategic decisions can be taken that could help the students. The above choices can improve the effectiveness and efficiency of administrative services. Further, it can enhance improvement efforts.

VI. CONCLUSION

Knowledge Management of customer relationships (student relationships) is the highest form of customer service, as it has long-term effects such as building student loyalty and value throughout the student's lifetime. By itself, the move to this level of purposeful sophistication in CRM is a strategic modification that has huge ramification in long-standing HEI competitiveness. Despite this, the introduction of knowledge management becomes a principal component in the strategic plan. There are many details to consider when undertaking such a challenging endeavour, including leadership issues, cultural issues, supporting processes, and competency development. The merger of knowledge management and customer relationship management is an undeniably strategic move; anything less undermines its potential.

DECLARATION

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Conflicts of Interest/ Competing Interests	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval or consent to participate, as it presents evidence that is not subject to interpretation.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	I am the sole author of the article

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Dr. Subhashini received her Phd from Brunel University in 2017. During her PhD journey, she published numerous articles, book chapters, and conference proceedings in the fields of Data Mining, Data Science, Business Intelligence, Knowledge Management, and Information Systems. She has published articles in the educational domain on the use of data mining for Decision-making. Teaching Areas: Information Technology, Multimedia Sciences, and Information Systems. Research Areas: Data Mining, Business Intelligence, Data Science, Machine Learning, Deep Learning and Information Systems.