Abdulla Thamer Jumma Aldharif AlShamsi[1],2, Suriati Akmal1*, Massila Kamalrudin3, Waqar Akbar1 , Manoj Kumar1 , Rosnani Ginting4

Prioritizing Library Service Quality in Higher Education: A combined Analysis using Analytic Hierarchy Process and Kano Model

Journal of Electrical Systems

Abstract: **-** The study prioritizes and ranks the quality of university library services by examining user satisfaction. The combined application of the Analytic Hierarchy Process (AHP) and the Kano model assess library service attributes and students satisfaction. The data was collected from students of Malaysian university through a structured survey, which measured their perceptions and expectations of the physical environment, staff responsiveness, and the efficiency of library services. The AHP was used to evaluate the factors that determine service satisfaction and reveal that tangible factors and the service environment emerged as the most important factors. Subsequently, the Kano model was used to classify them as must-be, one-dimensional, and attractive factors to illustrate their impact on user satisfaction. The present study demonstrates that although essential services are not disregarded, an increasing number of students expect more personalized services that adapt to their needs. The study provides the valuable insights for universities and offer guidance to strategically prioritize library service quality to maintain the relevance and importance to libraries in higher education

Keywords: *Library service quality, user satisfaction, AHP, Kano model, service prioritization, higher education,*

1. INTRODUCTION

In recent years, universities have shifted towards a more user-oriented approach to managing their services with an increased focus on user satisfaction. This trend reflects broader changes occurring in higher education, which is becoming increasingly competitive in the present landscape. Universities regard students and staff members as their customers (Gravett et al., 2020) and need to fulfil their satisfaction (Ali, et al., 2022 ; Krücken, 2021). Calma and Dickson-Deane (2020) urge that treating students as customers may benefit universities and in the long term these students may promote academic integrity and contribute to universities being loyal alumni. Various aspects of a university may increase student and staff satisfaction, such as curriculum relevance (Kanwar & Sanjeeva, 2022), extracurricular activities (Griffiths et al., 2021), campus facilities (Wong & Chapman, 2023), technology infrastructure (Karadag & Ergin-Kocaturk, 2021) are few of them. These resources have been discussed in prior studies. However, the impact of the library, though equally important, has been overlooked in recent years (Cox, 2021).

University libraries have been the epitome of knowledge and information for decades, serving as the cornerstone of academic excellence. Consequently, universities whose services, including advanced library services, are distinctly superior to those offered by other universities are more likely to succeed in terms of attracting students and staff and increasing their global academic competitiveness (Ashiq, et al., 2022). Thus, as part of the current shift in university services, libraries are being held under increasing scrutiny with their quality being expected to be assessed. To succeed in the new conditions, libraries need to meet the students' and staff expectations and contribute to the universities' success (Cox, 2021).

[1]Institut Pengurusan Teknologi dan Keusahawanan, Universiti Teknikal Malaysia Melaka, Malaysia
2Abu Dhabi Airports Company PJSC, PO Box 94449, Abu Dhabi, United Arab Emirates.
3Faculti Teknologi Maklumat dan Komunikasi, Universiti Teknikal Malaysia Melaka, Malaysia
4Department of Industrial Engineering, Universitas Sumatera Utara, Medan 20222, Indonesia
*Corresponding Author: suriatiakmal@utem.edu.my

The library premises support all the needs and tasks of students and faculty members, such as seamless access to various physical and electronic information sources and an environment for studying, writing, and researching (Lotfy et al., 2022). It serves as a trusted hub for knowledge dissemination by ensuring reliable, credible and authentic information. Admittedly, Libraries are intellectual centers that promote knowledge creation and exchange, academic development, and cooperation (Garoufali & Garoufallou, 2024). They are not merely repositories of information but also facilitators of critical thinking and research productivity. A well-functioning library that meets user expectations contributes to a positive learning environment, while dissatisfaction can hinder academic success and diminish the library's role as a cornerstone of university education (Akinyemi, 2023).

One of the key challenges facing libraries is the need to strike a balance between offering standardized services that meet basic expectations and providing differentiated services that enhance user satisfaction. Measuring the service quality in libraries, much like in other service-oriented sectors, is multidimensional and complex. It goes beyond merely providing access to resources and extends to the physical environment, the efficiency of staff, the reliability of services, and the responsiveness of personnel (El Alfy, 2023). Ande, (2024) states that service quality reflects how well the service delivery system meets customer needs. This concept is particularly relevant in libraries, where the quality of the physical environment (tangibles), staff responsiveness, and the reliability of service are crucial factors that contribute to user satisfaction (Alam & Mezbah-ul-Islam, 2023). The tangibility of library services, such as the quality of the physical facilities and equipment, plays an important role in shaping users' perceptions.

Libraries ought to enhance a conductive environment that is well equipped and safe to facilitate the various activities ranging from academic, for individuals and groups up to research (Ullah & Usman, 2023). An additional influential factor for the quality of services provided by universities is the reliability and competence of the library staff. The essence of libraries as service organizations is the heavy reliance on the personnel for accurate and efficient provision of services by this organization. As such the users of library services hope that the library staff is knowledgeable in their tasks, courteous, and trusted. (Kinya & Muthee, 2022). Consequently, the extent to which the library meets the expectations of the users is directly related to their opinions concerning the quality of services provided. In line with this testimony, the critical areas of this research study are the competence and responsiveness of library staff (Ashiq et al., 2023).

Although these services are essential, today users expect personalized and flexible services to meet their demands. Thus, libraries must evaluate and continually enhance the services they offer to keep up with changes in user expectations and remain relevant in the academic landscape (Ashiq et al., 2021). Meeting user needs through the provision of high-quality services is heavily reliant on an understanding of users' perceptions and expectations of the services provided. Navigating the shift of user perceptions and expectations of service provision is particularly problematic in the context of university libraries (Winata et al., 2021). Users of university libraries expect the services they use to meet their academic needs; at the same time, they have wider service delivery expectations in relation to convenience, comfort, and efficiency. Failing to meet these needs could result in libraries losing their central position in the academy as places for acquiring knowledge on university campuses (Kaushal & Yadav, 2022).

University libraries need to choose service quality factors on which to concentrate in order to continue being relevant within the academic environment and in response to the changing expectations of users. Although the library environment strives to balance the need for basic traditional service quality factors that libraries have always provided, such as access to sources and a supportive environment in which to study, with the new demands prompted by changes

among library users and technological work environment (Akbar et al., 2021). It is becoming increasingly clear that more sophisticated service and personalization of the experienced are envisioned. Hence, each library should have a mechanism for selecting and ranking the most critical service quality factors.

Analytic Hierarchy Process is the approach which may provide a systematic method to help libraries prioritize these factors based on their weights so that libraries could make better decisions on establishing or reallocating resources in a more proper way (Khan el al., 2024). While AHP quantifies each attribute and helps ranking them in a more actionable priority level, the study employs the Kano model to strengthen the AHP and categorize these attributes and explain how they would affect user satisfaction. The Kano model identifies which factors are necessary to prevent dissatisfaction (basic needs), which enhance satisfaction when improved (performance needs), and which can surprise and delight users when exceeded (excitement needs) (Xiao et al., 2024) (Xiao et al., 2024; Yu & Huang, 2020). Considering the gap in the literature above, the present study applies the dual approach using AHP for ranking the importance of different service quality factors based on user opinions and the Kano model for classifying these factors depending on the level of the potential impact on user satisfaction. This approach allows development of both key user requirements and needs, with university libraries being able to focus on those factors that can enhance the overall user satisfaction and retain their prominent positions in the academic context.

2. LITERATURE REVIEW

2.1 Service Quality

Service quality is essential for customer satisfaction. In university libraries in particular, the quality of service is central to their survival. These libraries must have a system for maintaining efficient, dependable, and customer-oriented service delivery to remain viable and provide customers with satisfaction (Rasheed, & Rashid, 2024). This evaluation of quality in university libraries includes services provided to clients in terms of physical structures, the competence of its staff, and the availability of resources.

In a more competitive service environment in today's, assessing service quality is highly correlated to the concept of university library progress, in that it can help hold back existing users as well as bring in new ones (Alam, 2023). "In either case the opinion of the users is considered as a reliable factor." Service quality is defined as the degree of overall impression a customer draws from the set of judgments as a result of the performance of service, it is the magnitude of discrepancy between service expected and service perceived (Mirghafoori et al., 2020). If the services provided meet the expectations of customers, the quality of service provided is satisfactory. If the services are not viewed as they expected, the customers will not be satisfied and will view the quality of service as poor. The most popular SERVQUAL model divides service quality into five main dimensions, such as reliability, tangibility, responsiveness, assurance and empathy (Raza et al., 2020).

2.2 Library Service Quality

In the library context, tangibility refers to physical spaces and resources. Reliability involves the quality of the library being consistent. Responsiveness is the relationship of how quickly the library staff can assist the customer. Assurance is the knowledge library personnel has of the services they provide. Empathy refers to the level of caring that is provided to meet the need of the user. Researchers can investigate these models in relation to library services to find ways of improving services and gain a high level of consumer satisfaction, allowing the library to continue as a required research tool (Khan et al., 2022).

The provision of quality library services to women would foster their empowerment through access to necessary educational resources and information, which would help them to develop personally and to promote their professional advancement. Being inclusive and targeting to meet the unique needs of users, libraries might contribute significantly to the empowerment of women and their integral participation in socio-economic development (Ahmed et al., 2024).

The SERVQUAL model, which is a highly popular tool for the measurement of service quality, also provides a good starting point to examine its different facets, namely, tangibility, reliability, responsiveness, assurance, and empathy. Although the analysis of different service industries which can benefit from the application of SERVQUAL is outside the scope of this paper, it is discernible from many research papers that the model is widely applicable. Thus, it can be applied to such very different customer service industries as the airline one (Jeeradist et al., 2016), banking (Dsouza *et al.*, 2018), education (Sahney, 2016), hotel (Ezeh et al., 2021), the food truck industry (Gopi and Samat, 2020), the retail sector (Thirumal Azhagan et al., 2021), healthcare(Al-Neyadi et al., 2018) and public sector (Ocampo *et al.*, 2019).

SERVQUAL has been used to measure the service quality in different libraries' setting around the world. Amanullah, Hasan, and Md. Hafez (2020) using the regression analysis to what the effect of service quality on user satisfaction of public library in Bangladesh. They concluded that tangibles are the most dominant predictors that influence degree of satisfaction of public library users. Similarly, Das and Handique, (2020) states university library services in Assam, India used SERVQUAL to measure satisfaction. Alam & Mezbah-ul-Islam (2023) also used regression analysis to evaluate the correlation between the service quality and satisfaction of Eastern University Library, Bangladesh.

The study used modified SERVQUAL which consist of resources, competency, responsiveness, demeanour and tangibles for measuring the satisfaction. From the perspective of user at Eastern University library, dimension of tangible facilities is the most influential factor on satisfaction. In Thailand, modified SERVQUAL consists of effect of service, library as a place, collection and access and effect of service were used to measure the service quality of central library (Pramesti and Kiatcharoenpol, 2021). The study investigates the level of satisfaction by analysing the user's expectation and perceived service. The zone of tolerance is used to determine which service quality items exceed, fall short of, or fall within the range of the user's acceptable level of service. Also, the dimensions are ranked in order of importance, with library as a place ranking first and collection and access ranking last.

2.3 Measuring Service Quality Using the LibQUAL Model

According Veasna, Chun, and Nimol (2015) state that, apart from SERVQUAL, two other tools and techniques are commonly used to measure library service: total quality management and LibQUAL. A consortium of American libraries, the Association Research Libraries, and Texas A&M University created LibQUAL in 2000. This is a web-based standardised tool that has been tested in other countries' libraries since its formation. Since its formation, LibQUAL has been revised three times (Veasna, Chun and Nimol, 2015).. The original version of LibQUAL measured one dimension: reliability from SERVQUAL, and four additional dimensions, including affect of service, library as place, provision of physical collections, and access to information. The latest version of LibQUAL measures three dimensions: Affect of Service, Information Control, and Library as Place. The dimension "Affect of Service" is related to the interactions between user and library staff and the general helpfulness and competency of library staff. "Information Control" refers to the extent to which users can find required information in the library and in the format that the latter demand, independently and autonomously.

When "Library as Place" is conceptualised, the aims of designing physical environment from quiet individual spaces to a lounge for socialising and collaboration are considered (Mohezar et al., 2021). Many scholars applied this tool to their research. For instance Ziaei and Korjan (2018), used LibQUAL to review the Tabriz Central library performance. Kumar and Mahajan (2019), examined the level of perceived quality service based on LibQUAL of the Maharshi Dayanand University. They found their overall perceived library service quality lower than their desired library service quality. Moreover, Ramezani *et al.*, (2018) used LibQUAL to evaluate the quality of Iranian university library service. This tool has been used to measure the quality of library services in a large number of university libraries around the world.

2.4 Comparison of library's service quality measurements in Malaysia

Based on the available literature, studies have been undertaken using SERVQUAL or LibQUAL in Malaysian libraries in measuring service quality for user satisfaction at Universiti Kebangsaan Malaysia (Choshaly and Mirabolghasemi, 2019), measuring the quality of quality of the Reader's Advisory Desk Service at Universiti Putra Malaysia (Iberahim and Nadzar, 2011), measuring student's perception and satisfaction using LibQUAL at Universiti Malaysia Pahang (Dahan *et al.*, 2016), measuring user satisfaction on the service provided at a public library in Kedah (northern state of Malaysia) using Academic Library Users Satisfaction (ALUS) dimension (Taib, Iteng and Lazim, 2018). The ALUS dimension developed by (Taib, Rante and Warokka, 2012) is a measurement for library service based on Quality Management System (QMS) ISO 9000. ALUS have five dimensions with 26 items and the dimension includes quality of library staff, quality of electronic services, service suitability, psychical facilities availability and services accessibility. In term of the research gap identified, a short summary of service quality measurement at library published between 2011-2021 as presented in Table 1. Based on Malaysian context, there are limited numbers of work measuring their user satisfaction and LibQUAL+ is the most selected dimension for service quality measurement. However, most of the service quality dimension is lacking information about service attribute that are most urgently need to be addressed.

Table 1 Comparison of library's service quality measurements in Malaysia

Author	Service Quality Dimension	Location	Library Domain
Iberahim and Nadzar (2011)	SERVQUAL	Universiti Putra Malaysia , Malaysia	Academic
Dahan et al. (2016)	LibQUAL+	Universiti Malaysia Pahang , Malaysia	Academic
Choshaly & Mirabolghasemi (2019)	LibQUAL+	Universiti Kebangsaan Malaysia, Malaysia	Academic
Taib, Iteng and Lazim (2018)	ALUS	Malaysia	Public
Saufiyudin Omar et al. (2021)	SERVQUAL	Politeknik Tuanku Syed Sirajuddin	Academic

Further, this study categorized each dimension into the physical environment, people, and process that are involved in providing the services. The item for each service quality factor is defined in Table 2.

Table 2 Dimensions of library's service quality measurements in Malaysia

	Measurements		
Service quality	Physical Environment	People	Process
SERVQUAL Dimensions	Tangibles	Responsiveness, Assurance, Empathy	Reliability
LIBQUAL Dimensions	Library as a place	Affect of service	Information control
ALUS Dimensions	-	Competence staff	Easy to access library service, compatible services, effective services, efficient services, reliable services, right services

3. METHODOLOGY

Based on findings from literature review, a set of questionnaire consists of SERVQUAL, SERVPERF, LIBQUAL and ALUS were used to measure the service quality at UTeM's library called Laman Hikmah in Malaysia. The questionnaire was designed to capture a wide range of user experiences and perceptions across different dimensions of service quality. It is characterized by 16 items, which are grouped into three dimensions: physical environment, people, and process. Data was collected through both online and in-person surveys distributed to library users, including students, faculty, and staff, ensuring a representative sample of the user population. The responses were then analysed to assess current service quality levels, identify strengths and weaknesses, and provide actionable insights for improvement.

The present study aims to employ AHP to rank these dimensions and discover the most critical factors of library service quality. In combination with the Kano model, it would be possible to better categorize the needs and preferences of users, determining the attributes that are vital to proper service quality (Xiao et al., 2024). In the long run, the concentration on these frameworks is expected to deepen the understanding of users' expectations and develop a set of strategies for improving the quality of services provided by the library.

The total number of UTeM students for undergraduate students and graduate students are 12892 and 1183, respectively, undertaking various programs by seven faculties and one institute in UTeM. There are about 871 academic staff in UTeM. According to Krejcie and Morgan (1970) indicated that the appropriate sample size for 14946 populations is 375. This survey, however, selected 400 respondents who were chosen randomly. Their inclusion as respondents is based on the consideration that most of them are regular users hence understood the facilities and services available at the Laman Hikmah. Thus, these users are, in essence, the most appropriate respondents selected to answer the questionnaires. In this study, the AHP-based questionnaire was distributed to senior lecturers at the UTeM. Only 25 experts were participated in this survey. These experts are senior lecturers from engineering and management faculties.

3.1 Questionnaire design and development

Based on findings from Table 1 and 2 in the literature review, a set of questionnaire consists of LIBQUAL+ and ALUS were used to measure the service quality at UTeM's library. Both measurements were selected in this study as they were developed specifically for measuring the service quality provided in a library. It is characterized by 15 items, which are grouped into three dimensions (physical environment, people and process). Table 3 shows the service measurement used in this study.

Table 3 Proposed library's service quality items in library for AHP method

Service Quality Tools	Service Quality Factor	Service Quality Item
LIBQUAL Dimensions (Sha & Verhoeven, 2017)	Physical Environment	Library as a place
		Comfortable and desirable overall atmosphere
		Is a good place for research and study
		The group has space for study and discovery
		May supply the appropriate printing or electronic journals to users
	People	Affect of service
		The librarian has the expertise to answer the question of the customer.
		Librarians are concerned about customers
		The librarian is ready to assist users
		Librarians are effective in meeting user needs
	Process	Information control
		Easy-to-use apps or electronic devices are available to help users find information easily.
		The home page of the library allows the user to obtain the information on their own
ALUS Dimensions (Taib et al., 2018)	People	Competence staff
		Staff at the library understands my specific needs and when they tell me something, they'll do it.
		Workers at the library have sufficient knowledge to answer your questions.
		Convince staff in the library.
	Process	Accessibility, effective and efficient service, easy to access
		Information on the Online Catalog (OPAC) offers accurate information on library content selection.
		The selection of electronic information from the library is very productive to meet your needs
		The library's collection of books suits your needs

4. RESULTS

4.1 Respondents Profile

The profile of the respondents consisting of gender, nationality and educational level was presented in Table 4. It can be seen from Table 8 that nearly half of the respondents were male students which contributed to the fact that UTeM is a technical university which monopoly by male students. The majority of the respondents were local students. Some of the respondents had undergraduate education accounting for 88.6% while postgraduate education accounted for 11.4%. Lastly, regarding the frequency of using Laman Hikmah services, 72.7% of the respondents used 1-2 times per week, 19.5% used 3-4 times per week and 7.8% used more than 5 times per week.

Table 4: Respondents profile

Particulars	Percentage
Gender	
Male	78.6
Female	21.4
Nationality	
Malaysian	96.6
International	3.4
Educational Level	
Postgraduate	11.4
Undergraduate	88.6
How often you use the service at Laman Hikmah?	
1-2 times per week	72.7
3-4 times per week	19.5
More than 5 times per week	7.8

4.2 Findings

The study analyzed the data using two methods. Firstly, the AHP technique was employed to prioritize the dimensions of service quality based on user preferences (Abdul et al., 2023). Once the study generated the results using AHP, the Kano model was used to classify service attributes according to their impact on user satisfaction, distinguishing between basic, performance, and excitement needs. The subsequent sections provide the results of each approach separately, offering a comprehensive understanding of the factors that influence library service quality and user satisfaction.

4.2.1 Findings based on AHP

AHP includes constructing the hierarchy, calculating of weight for all factors in all hierarchies, and developing the ranking. The Saaty scale was used to measure the items. Also, several other questions were asked to indicate the respondent's status in the university, faculty, and frequency of going to the library.

Step 1: Construct the AHP hierarchy structure as shown in Fig. 1. The top level represents overall objective, thus library service quality is set as the goal and is labelled as LQ. The middle levels represent primary factor where $(LQ_i, i=1-3)$ for evaluating library service quality are determined: physical environment, people and process. The low level represents the sub-factor $(LQ_{ij}, i=1, j=1-3; LQ_{ij}, i=2, j=1-5; LQ_{ij}, i=3, j=1-7)$ that is assigned to each of the three primary factors and it consists of 16 sub-factors.

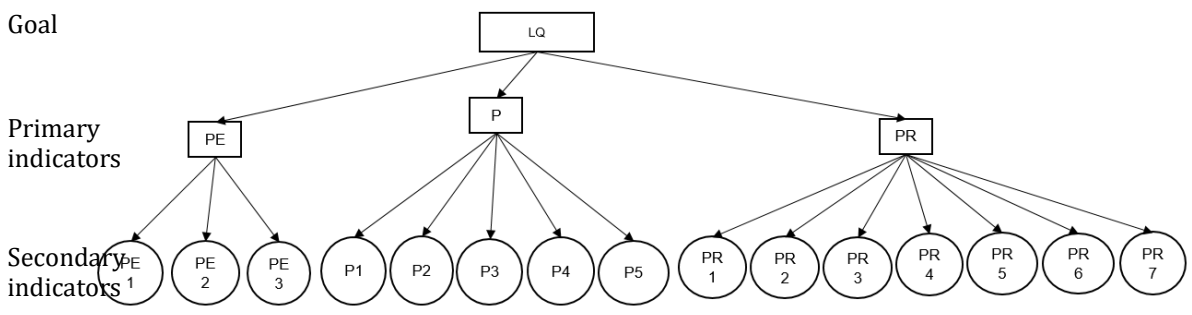

Fig. 1 The Laman Hikmah's service quality hierarchy in this study

The factor at each level must be of the same magnitude and must be related to some or all of the elements at the next higher level (Singh, 2016). The decision alternatives are at the lowest level. Table 5 presents the factors and definitions in this study.

Table 5 The Laman Hikmah's service quality indicators and definitions

Label	Criteria	Description
PE (Physical environment)		
PE1	Tangibles	the physical evidence of the service, such as: the appearance of the physical facilities, equipment, personnel and etc.
PE2	Physical service environment quality	The surrounding environment in the service encounter.
PE3	Library as Place	concerned with the physical environment of the library as a place for individual study, group work, and inspiration
P (People)		
P1	Responsiveness	Librarian's degree of willingness to help customers and provide them with prompt services.
P2	Assurance	Knowledge that librarian have and how courteous they are when dealing with library patron.
P3	Empathy	Caring attention provided by the library for its patron.
P4	Affect of Service	applied to user experience questions and general support and expertise of library staff
P5	Competence Staff	a person's performance in a job that can be seen from the thoughts, attitudes, and behaviors
PR (Process)		
PR1	Reliability	library's ability to perform the promised service dependably, accurately.
PR2	Information Control	related to whether users can find the required information separately and autonomously in the library in the format of their choice
PR3	Easy to Access	Library accessibility
PR4	Compatible Services	Operating hours and material inside the library is appropriate to user.
PR5	Effective Services	(Online Catalogue, provide photocopying services, directions provided clear, provide sufficient numbers of computers, number of chairs or tables)
PR6	Efficient Services	(Provide training, provide right services, collection of books or electronics information)

Label	Criteria	Description
PR7	Right Services	(Online Catalogue (OPAC) provides accurate information regarding collection of library materials, library emphasizes no error (zero error) on the services offered)

Step 2: Performing pairwise comparison matrix between attributes for each level of hierarchy. The experts were asked to compare the relative importance of two selected items, for example: "what do you think this indicator A compares against to indicator B?" There are $n\times(n-1)$ judgements required to develop the set of matrices. In this step, the expert assigns a score according to the importance of each item: equally important (valued at 1), moderately important (valued at 3), strongly important (valued at 5), very strongly important (valued at 7), extremely important (valued with 9) and intermediate values between two qualitative judgments are represented by value 2, 4 and 6. It requires the knowledge and experience of experts (decision-makers) to compare the items. An item i represented on the left of the matrix is compared against an item j represented on the top of the matrix. If is more important than j, then a numerical value greater than one is used in the (i, j), otherwise, the reciprocal value entered in the (i, j). The diagonal entries are entered 1 because when a criterion is compared with itself there is no priority of inferiority (Singh, 2016). Table 6 presents the matrix for comparing the indicators concerning the basic goal of service quality.

Table 6 Pairwise comparison matric of primary indicators with respect to the overall objective

	j		
i	PE	P	PR
PE	1.000	1.190	1.010
P	0.840	1.00	1.180
PR	0.990	0.847	1.000

Step 3: The next step is to determine the relative importance weight or priority vector for each item in the level hierarchy. For this purpose, the experts' scores were used to develop the pairwise comparison matrixes. The matrix normalization is conducted which starts with the calculation of summation all items of a column. Then, each item of a column in a matrix is divided by its column sum. This present study calls this process as column sum. This is followed by next calculation step of summarizing the row. Priority vector is calculated by adding the items in each resulting row and divided with the number of item. This will give the priority vector for the comparison matrix giving the relative weights of each item. Table 7 shows the detail of the evaluation criteria of the secondary indicators.

Table 7 Pairwise comparison matric of secondary indicators with respect to the overall objective

i	**J**							**Priority vector**
Physical Environment	PE1	PE2	PE3					
	0.448	0.494	0.385					0.443
	0.293	0.323	0.393					0.337
	0.258	0.182	0.222					0.221
People	P1	P2	P3	P4	P5			
	0.284	0.339	0.326	0.238	0.209			0.279
	0.188	0.224	0.298	0.220	0.214			0.229
	0.152	0.132	0.175	0.275	0.242			0.195
	0.184	0.158	0.099	0.155	0.194			0.158
	0.1912	0.1478	0.102	0.113	0.141			0.139
Process	PR1	PR2	PR3	PR4	PR5	PR6	PR7	
	0.199	0.253	0.248	0.187	0.183	0.159	0.147	0.196
	0.138	0.176	0.232	0.201	0.184	0.164	0.153	0.178
	0.118	0.111	0.147	0.194	0.195	0.174	0.160	0.157
	0.143	0.117	0.101	0.134	0.167	0.153	0.143	0.137
	0.126	0.111	0.088	0.093	0.116	0.160	0.157	0.122
	0.138	0.118	0.093	0.097	0.080	0.110	0.140	0.111
	0.136	0.115	0.092	0.094	0.074	0.079	0.100	0.099

Step 4: For validating the judgment in step 2, a consistency of the pairwise comparison called consistency ratio (CR) should be performed. If the CR is less than 0.10 then weight results are acceptable and valid, otherwise, the quality of judgemental data should be improved and revised (Saaty & Vargas, 2013). To compute CR, weighted sum vector (eigenvector A) value is first obtained by matrix multiplication of priority vector and pair wise comparison matrix. Each of the weighted sum vectors is divided by the corresponding priority to obtain eigenvector B. The maximum eigenvalue $\lambda_{\max}$ is obtained by averaging numbers in vector B. $\lambda_{\max}$ is set as the largest eigenvalue of the matrix and the value is 3.012 for primary indicator. The $\lambda_{\max}$ for secondary indicators are 3.022, 5.1172 and 7.1238 for physical environment, people and process, respectively. Then, CR is obtained by dividing CI by random index (RI) for the same matrix size n.

$$CR = CI/RI = \left((\lambda_{\max} - n)/(n-1)\right) \quad (1)$$

The overall CR value for this study is 0.01 and all factors are acceptable to further analysis. Step 2 is repeated for the secondary factors. Due to lengthy calculation, the weights of the secondary factor are listed in Table 8. The CR for physical environment, people and process are 0.019, 0.026 and 0.016, respectively. The CR was less than 0.1, meaning the primary matrix meet the consistency requirement.

Table 8 Weights of the secondary factor

Secondary factor	W_{ij}	Secondary indicator	W_{ij}	Secondary indicator	W_{ij}
PE1	0.443	P1	0.279	PR1	0.196
PE2	0.337	P2	0.229	PR2	0.178
PE3	0.221	P3	0.195	PR3	0.157
		P4	0.158	PR4	0.137
		P5	0.139	PR5	0.122
				PR6	0.111
				PR7	0.099

Step 5: Global priority calculation P_i for the decision alternative represented in Table 9 was obtained by combining decision alternatives scores with the criterion weights (Singh, 2016). This is obtained by weighted summation score:

$$P_i = j = \sum^{n} W_j x L_{ij} \forall_i \quad (2)$$

Where P_i is the global priority for alternative i; W_j is the weight of criterion j; L_{ij} the local priority; n the total number of decision criterions.

Table 9 The global priority for all factors

Factors	WEIGHT	Rank	Label (sub-factors)	Weight for sub-factors	Rank	Global weights	Global rank
Physical environment	0.354	1	PE1	0.443	1	0.157	1
			PE2	0.337	2	0.119	2
			PE3	0.221	3	0.078	4
People	0.332	2	P1	0.279	1	0.093	3
			P2	0.229	2	0.076	5
			P3	0.195	3	0.065	6
			P4	0.158	4	0.052	9
			P5	0.139	5	0.046	11
Process	0.314	3	PR1	0.196	1	0.062	7
			PR2	0.178	2	0.056	8
			PR3	0.157	3	0.049	10
			PR4	0.137	4	0.043	12
			PR5	0.122	5	0.038	13
			PR6	0.111	6	0.035	14
			PR7	0.099	7	0.031	15

4.2.2 Findings based on Kano Approach

Kano is used in this study to analyze the service quality requirements based on satisfaction. The factors selected from AHP became the basis for the Kano questionnaire as presented in Table 10. Each question is formulated from a pair of positive and negative questions about service quality. The first question refers to the reaction of the customer if the service exists which is called the functional (positive) question. The second question is the reaction when they are not present. This question is called a dysfunctional (negative) form of the question. A Likert scale (1 represents I like it to 5 as I dislike it) was used to identify the degree of customer preference towards the quality attribute of a service. The customer requirements can

be assigned based on the combination of responses to functional questions and dysfunctional questions.

Table 10 The attribute for Kano model analysis based on AHP

Rank	Label	Criteria	Description	Attributes for Kano analysis
1	PE1	Tangibles	the physical evidence of the service, such as: the appearance of the physical facilities, equipment, personnel and etc.	Modern equipment that lets me easily access needed information (K5);
2	PE2	Physical service environment quality	The surrounding environment in the service encounter.	Library's collections and services easy to access (K21)
3	P1	Responsiveness	Librarian's degree of willingness to help customers and provide them with prompt services.	Employees who deal with users in a caring fashion (K12); Employees who understand the needs of their users (K13); Dependability in handling user's service problem (K14)
4	PE3	Library as Place	concerned with the physical environment of the library as a place for individual study, group work, and inspiration	Library space that inspires study and learning (K15); Quiet space for individual activities (K16); A comfortable and inviting location (K17); Community space for group learning and group study (K18)
5	P2	Assurance	Knowledge that librarian have and how courteous they are when dealing with library patron.	Employees who have the knowledge to answer user questions (K12)
6	P3	Empathy	Caring attention provided by the library for its patron.	Making electronic resources accessible from my home or office (K1).
7	PR1	Reliability	Library's ability to perform the promised service dependably, accurately.	A library Web site enabling me to locate information on my own (K2)
8	PR2	Information Control	related to whether users can find the required information separately and autonomously in the library in the format of their choice	Library website and Online Library Catalogue (OPAC) is easy to access (K19)
9	P4	Affect of Service	applied to user experience questions and general	Library information such as pamphlets, brochures, and

			support and expertise of library staff	information are easy to access (K22)
10	PR3	Easy to Access	Library accessibility	Library facilities such as reading room, computer lab easy to access (K20)

The reliability test of the Kano questionnaire was conducted by using SPSS. the reliability test was conducted to ensure that the consistency and reliability of the Kano questionnaire answers against the questions are consistent and stable over time. Cronbach's Alpha of more than 0.7 indicates that the questionnaire is reliable. The Cronbach's Alpha shows that the value of 'Functional' is 0.935 and 'Dysfunctional' is 0.953. These values show that the Kano questions are reliable as it is greater than 0.7. Therefore, the next analysis which is by the Kano method can be conducted.

The answer for each paired question refers to a requirement that is categorized according to a 5 x 5 matrix of evaluation sheet. This process is repeated for all paired questions and all the respondents. It is illustrated in Figure 1. This model was improved by developing the satisfaction (SI) and dissatisfaction (DI) index (Berger et al., 1993; Matzler et al., 1996). The CS indicates the strength of service features that may have an impact on customer satisfaction. The DS shows the strength of non-fulfilment of service feature influences customer dissatisfaction (Mkpojiogu & Hashim, 2016). In other words, it indicates the extent to which satisfaction increases if a service requirement is met and the extent to which satisfaction decreases of a service requirement is not met. These calculations help to compute the average impact of the service requirement on the satisfaction of respondents. The formulation for CS, DS and total satisfaction were adopted from (Berger et al., 1993).

In evaluating the results, this study adheres to the rules of Kano suggested by the statement that the priority of the improvement is the element on the must be and one dimensional requirements (Sauerwein et al., 1996). After the survey, the responses were classified and evaluated in a semi-automated Kano analysis Excel.The expectation of services from the Laman Hikmah's patron, a graph was represented in a graph of satisfaction-dissatisfaction, as shown in Fig. 2.

Fig. 2 shows that most attributes of service quality were plotted in the second quadrant and categorized as 'Must-be' (M) attributes. If Laman Hikmah does not provide one of the attributes listed in this quadrant, there are high chances of dissatisfaction. Surprisingly, only one attribute labelled as K16 (Quiet space for individual activities) falls at the first quadrant which is 'Attractive' (A).

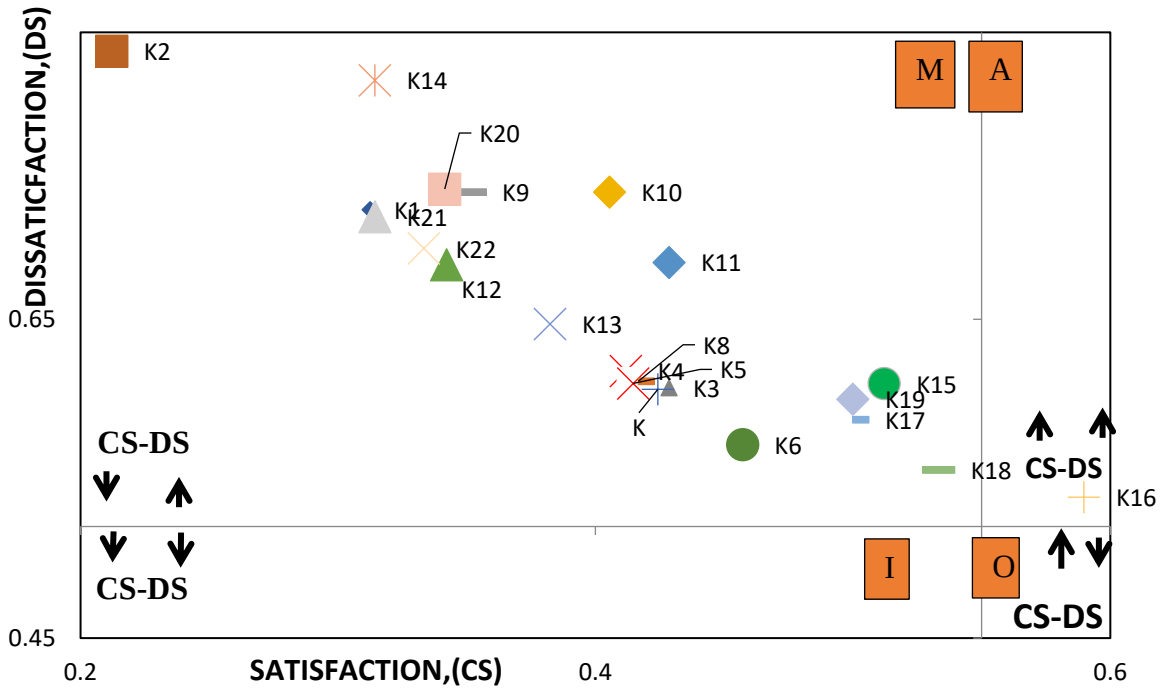

Fig. 2 Satisfaction and dissatisfaction of service quality features by *Laman Hikmah's patron*

5. DISCUSSION

The integration of the Analytical Hierarchy Process (AHP) and Kano Model in this study provides a comprehensive perspective on the factors influencing service quality in university libraries. The most significant dimensions identified through the AHP results included the physical environment, people, and process dimensions. Importantly, the physical environment dimension emerged as the most critical factor among them, implying that users tend to base their overall satisfaction on such tangible elements as the appearance of physical facilities, equipment, and personnel. This finding is consistent with previous literature focusing on the significance of physical surroundings in service settings. For instance, Khan et al. (2022) and Alam & Mezbah-ul-Islam (2023) demonstrate that maintaining a visually appealing environment is highly important for user satisfaction in libraries. The comparatively high global weight related to the physical environment, in general, and its components, such as library's equipment or overall look, in particular, implies that the library management should make an effort to ensure that tangible elements of the library are positively received by the users.

In contrast, In conclusion, it is important to note that, although the people dimension, which includes staff responsiveness, assurance, empathy, and competence, was rated slightly higher, the place component of service quality remains paramount. That is, it appears that competent and courteous staff is important, but their impact may be somewhat less than that of the physical environment. In a way, this claim can be seen as controversial because many references on the issue underline the importance of human interaction (Kreuzer et al., 2020 ; Boon & Yoshimura, 2020), . However, it corresponds with the idea of a balance between the physical and human components. On the one hand, staff must be well-trained, and library management needs to ensure that they are responsive and competent enough to satisfy patrons. On the other, improvements in physical dimensions appear to be more influential.

The third-ranked importance had the process dimension, including reliability of service, control, and accessibility of information and effective service. The finding means that while process-related factors are important, they are perceived as slightly less critical compared to physical and interpersonal dimensions which agrees with the literature in relation to the prominence of efficient processes in service quality but their potential lower significance as compared to human and tangible factors (Ali et al., 2021; Raza et al., 2020). Thus, while libraries should work to enhance processes efficiency, they should also try to balance these efforts with those related to physical and interpersonal dimensions.

Another analysis that could provide more narrow information about service quality would be the Kano model analysis, which distinguishes user needs and attributes of services according to satisfaction and dissatisfaction. In the context of the current study, the Kano model analysis will show that the majority of service quality attributes belong to the 'Must-Be' category. This mean that such attributes are "fundamental to users' satisfaction, and their absence is likely to lead to dissatisfaction". As the literature review indicates, previous studies have also stressed the necessity to meet the "minimum expectations of service quality" as "essential in avoiding user dissatisfaction" (Rane et al., 2023). Regarding universities libraries, this means that the regular provision of such basic attributes at the library as reliable services, an accessible library, and competent staff is required for user satisfaction and an absence of negative experiences.

It is fascinating that only one attribute "Quiet space for individual activities" was ranked as 'attractive', which means that providing a quiet and calming place for studying on their own does not necessarily contribute to a higher satisfaction for the users, it may instead serve as an additional feature to attract a certain type of visitors. According to Lassleben and Hofmann (2023), attractive attributes can significantly differentiate the service and create additional value, but their absence does not result in dissatisfaction. Thus, creating appropriate conditions for work in the library and investing into the features that can make the space comfortable and inspiring for others can facilitate a higher recognition of the library compared to its competitors.

The Satisfaction and dissatisfaction indices, originating from the results of the Kano analysis, represent the quantitative reach of service attributes impact on user satisfaction (Santhoshkumar et al., 2022). Final results of these calculations allow for determining, which attributes have the most significant influence on user satisfaction, and which of them should serve as a priority for improvement. I.e., the indices mark to what percent meeting or not meeting specific requirements helps in affecting the overall satisfaction, and, thus, further develop a plan for effective changes. Thus, service improvement can be planned with regard to how much a specific aspect influences satisfied or dissatisfied experiences.

6. IMPLICATIONS OF THE STUDY

On the whole, it can be concluded that the integrated use of the AHP and Kano team provides the framework of evaluating and raising the quality of service in academic libraries. The results of the current study showed that the cost-premium strategy was the most appropriate option since all factors should be balanced, especially in terms of the physical, interpersonal, and process categories. Although improvements in the physical environment category are likely to have a more immediate impact on users' satisfaction, the consideration of both basic and 'Attractive' dimensions is necessary to improve user experience. In terms of practical significance, the integrated approach proposed in this study indicates that the focus on both basic service expectations and extra features to be added to improve the overall quality of service can inform library management (Rane et al., 2023). In terms of theoretical significance, the current study's results seem to be in line with existing research and make a

novel contribution to investigating the relative importance of service quality dimensions in academic libraries.

The study offers several recommendations for the university library regarding the ways to improve the quality of its service. The library should focus on its physical environment has been revealed to have high priority among the students. Therefore, the library is recommended to concentrate on its physical appearance and facilities. Investing into the tangible attributes of the library, such as the modernization of equipment and facilities, and overall improvement of the appearance of the place are likely to make students more satisfied and visitors of the library. The university library should also focus on the basic objects and 'Attractive' objects while conducting the Kano model analysis (Albuquerque et al., 2024). Thus, it is important to meet the core requirements, such as providing reliable service and offering convenient facilities to avoid dissatisfaction of visitors. At the same time, the library should consider introducing the attributes, which can make library users more satisfied, such as quiet places for studies and inspiring environment. Concerning interpersonal interaction, the library should also work on the development of relevant skills in its staff. Making sure that the employees of the libraries are qualified, responsive, and polite would help the university library to satisfy its users' expectations.

7. LIMITATIONS AND FUTURE RECOMMENDATIONS

The study similar like other studies also confined to several limitations, one of the limitations is that the present study relines on a single university within Malaysia. Despite the target university provides the diversified response, the study may not have adequately captured the user needs and quality perceptions of library services. Moreover, the present study utilizes a cross-sectional design, it may not have accurately ascertained the feelings and the needs of the users. That is true because the approach did not provide for the test of the perception of the services regarding time. It is worth noting that the user perceptions of the quality of services in the cross-sectional approach are assumed to be constant.

Another limitation of the present study lies with its methodologies, though, both AHP and Kano models provide valuable insights over the priorities of service quality qualities and the level of user satisfaction, different aspects of the user's experience might not be covered by these methodologies. The process of AHP is efficient because it helps to prioritize the factors which have the most impact (Wang et al., 2022). However, this method also limits the approach to complex interactions among different values and attributes related to service quality. In a similar way, the Kano model's focus on the certain elements affecting satisfaction and dissatisfaction rates does not cover the entire scope of what is related to service quality. For example, the specificity of certain emerging technologies can go beyond traditional classifications or might be not in line with the identification provided by the model. At the same time, it can happen that some user behaviours are not identified by Kano model as a value having a positive or negative impact but should not be disregarded in studying service quality.

Future studies can use more inclusive approach regarding the number and types of libraries being analysed as well as the scope of the review. Further, this would also be beneficial to conduct longitudinal studies to examine the trends and variations of the satisfaction levels over the period of time. The study recommends conducting the qualitative study to get more insights on satisfaction level and explore the students needs within libraries. Further it is also necessary to move beyond academic libraries as other types of such institutions would benefit from the investigation even more. Finally, the study of technologies in this area might warrant more profound investigation.

8. CONCLUSION

This study significantly applied the AHP and Kano models in evaluating service quality in university libraries. Apparently, the AHP analysis outlined that the physical environment, particularly the concreteness of the service quality, had the most significant effect in enhancing the quality of service delivery. The Kano model clearly outlined that the 'Must-be' quality attributes, such as provision of modern equipment and essentially quiet study room, facilitated satisfaction among users of the libraries.

Consequently, the 'Attractive' quality attributes, such as creation of an inspiring environment at the university libraries, enhanced the overall satisfaction of service delivery at the library. Therefore, the evaluation outlined that physical and the service environment must be improved to satisfy the users of the libraries and improve the quality of service delivery. Subsequently, future research should employ the findings of this research in determining additional factors that influence the quality of service delivery at the academic libraries.

ACKNOWLEDGMENTS

The authors would like to thanks the Universiti Teknikal Malaysia Melaka (UTeM) for their support in obtaining materials and all those who participated in the study.

REFERENCES

[1] Abdul, D., Wenqi, J., & Sameeroddin, M. (2023). Prioritization of ecopreneurship barriers overcoming renewable energy technologies promotion: A comparative analysis of novel spherical fuzzy and Pythagorean fuzzy AHP approach. *Technological Forecasting and Social Change*, *186*, 122133.

[2] Ahmed, M., Kumar, M., Ahmad, A., Khan, S., & Azeemi, I. (2024). Empowering Women through Tourism and Financial Development: Empirical Evidence from Upper Middle-Income Economies. *International Journal of Social Science & Entrepreneurship*, *4*(1), 163-183.

[3] Akbar, W., Jaafar, N. I., & Mohezar, S. (2021). Technological work environment: instrument development and measurement. *Behaviour & Information Technology*, *42*(1), 25–45.

[4] Akinyemi, O. (2023). Enhancing Academic Library Service Delivery Using Artificial Intelligence (AI).

[5] Alam, M. J., & Mezbah-ul-Islam, M. (2023). Impact of service quality on user satisfaction in public university libraries of Bangladesh using structural equation modeling. *Performance Measurement and Metrics*, *24*(1), 12-30.

[6] Albuquerque, A., Becerra, C., Melo, F. J. C. D., & Medeiros, D. D. D. (2024). Application of an approach integrating the Kano model and the fuzzy systems theory: a strategic analysis of consumer satisfaction scores. *The TQM Journal*.

[7] Ali, B. J., Gardi, B., Othman, B. J., Ahmed, S. A., Ismael, N. B., Hamza, P. A., ... & Anwar, G. (2021). Hotel service quality: The impact of service quality on customer satisfaction in hospitality. *International Journal of Engineering, Business and Management*, *5*(3), 14-28.

[8] Ali, M., Amir, H., & Ahmed, M. (2024). The role of university switching costs, perceived service quality, perceived university image and student satisfaction in shaping student loyalty. *Journal of Marketing for Higher Education*, *34*(1), 201-222.

[9] Amarasekara, K. M. R. K., & Marasinghe, M. M. I. K. (2020). User Satisfaction on library resources and services: survey conducted in main library of the Open University of Sri Lanka. *Journal of the University Librarians Association of Sri Lanka*, *23*(2).

[10] Ande, D. F., Wahyuni, S., & Kusumastuti, R. D. (2024). Investigating the impact of service leaders' competencies, organisational service orientation, network capabilities, and perceived service quality on Umrah travel agencies' performance. *Journal of Islamic Marketing*, *15*(3), 653-681.

[11] Ashiq, M., Jabeen, F., & Mahmood, K. (2022). Transformation of libraries during Covid-19 pandemic: A systematic review. *The journal of academic librarianship*, *48*(4), 102534.

[12] Ashiq, M., Rehman, S. U., & Mujtaba, G. (2021). Future challenges and emerging role of academic libraries in Pakistan: A phenomenology approach. *Information Development*, *37*(1), 158-173.

[13] Ashiq, M., Ur Rehman, S., Muneeb, D., & Ahmad, S. (2022). Global research on library service quality: a bibliometric analysis and knowledge mapping. *Global Knowledge, Memory and Communication*, *71*(4/5), 253-273.

[14] Boon, S. D., & Yoshimura, S. M. (2020). Revenge as social interaction: Merging social psychological and interpersonal communication approaches to the study of vengeful behavior. *Social and Personality Psychology Compass*, *14*(9), e12554.

[15] Calma, A., & Dickson-Deane, C. (2020). The student as customer and quality in higher education. *International Journal of Educational Management*, *34*(8), 1221-1235.

[16] Chan, V. H. Y., Chiu, D. K., & Ho, K. K. (2022). Mediating effects on the relationship between perceived service quality and public library app loyalty during the COVID-19 era. *Journal of Retailing and Consumer Services*, *67*, 102960.

[17] Cox, J. (2021). Positioning the academic library within the institution: A literature review. *Positioning the Academic Library within the University*, 9-33.

[18] Cox, J. (2021). The higher education environment driving academic library strategy: A political, economic, social and technological (PEST) analysis. *The Journal of Academic Librarianship*, *47*(1), 102219.

[19] El Alfy, S. (2023). Community orientation: an overlooked pillar of market-oriented higher education institutions. *Journal of Marketing for Higher Education*, *33*(2), 182-204.

[20] Esmaeili Givi, M., Keshavarz, H., & Kargar Azad, Z. (2023). Quality assessment of E-learning website using asymmetric impact–performance analysis and Kano's customer satisfaction model: a case study based on WebQual 4.0. *Information Discovery and Delivery*, *51*(1), 35-46.

[21] Garoufali, A., & Garoufallou, E. (2024). Transforming libraries into learning collaborative hubs: the current state of physical spaces and the perceptions of Greek librarians concerning implementation of the "Learning Commons" model. *Global Knowledge, Memory and Communication*, *73*(6/7), 828-852.

[22] Gilal, F. G., Paul, J., Gilal, R. G., & Gilal, N. G. (2023). Advancing basic psychological needs theory in marketing research. *International Journal of Market Research*, *65*(6), 745-777.

[23] Gravett, K., Kinchin, I. M., & Winstone, N. E. (2020). 'More than customers': Conceptions of students as partners held by students, staff, and institutional leaders. *Studies in Higher Education*, *45*(12), 2574-2587.

[24] Griffiths, T. L., Dickinson, J., & Day, C. J. (2021). Exploring the relationship between extracurricular activities and student self-efficacy within university. *Journal of Further and Higher Education*, *45*(9), 1294-1309.

[25] Gui, J., Kono, S., & Walker, G. J. (2021). How do work and leisure contribute to Hong Kong Chinese'life satisfaction?. *Journal of Leisure Research*, *52*(4), 508-528.

[26] Kang, W., Shao, B., Du, S., Chen, H., & Zhang, Y. (2024). How to improve voice assistant evaluations: Understanding the role of attachment with a socio-technical systems perspective. *Technological Forecasting and Social Change*, *200*, 123171.

[27] Kanwar, A., & Sanjeeva, M. (2022). Student satisfaction survey: a key for quality improvement in the higher education institution. *Journal of innovation and entrepreneurship*, *11*(1), 27.

[28] Karadag, E., Su, A., & Ergin-Kocaturk, H. (2021). Multi-level analyses of distance education capacity, faculty members' adaptation, and indicators of student satisfaction in higher education during COVID-19 pandemic. *International Journal of Educational Technology in Higher Education*, *18*(1), 57.

[29] Kaushal, V., & Yadav, R. (2022). The role of chatbots in academic libraries: An experience-based perspective. *Journal of the Australian Library and Information Association*, *71*(3), 215-232.

[30] Khan, A. U., Ma, Z., Li, M., Hu, W., Khan, M. N., Sohu, J. M., & Aziz, F. (2024). Beyond Bookshelves, how 5/6G Technology Will Reshape Libraries: Two-Stage SEM and SF-AHP Analysis. *Technology in Society*, 102629.

[31] Khan, A. U., Rafi, M., Zhang, Z., & Khan, A. (2023). Determining the impact of technological modernization and management capabilities on user satisfaction and trust in library services. *Global Knowledge, Memory and Communication*, *72*(6/7), 593-611.

[32] Khan, A. U., Zhang, Z., Chohan, S. R., & Rafique, W. (2022). Factors fostering the success of IoT services in academic libraries: a study built to enhance the library performance. *Library Hi Tech*, *40*(6), 1976-1995.

[33] Kinya, C., & Muthee, D. (2022). Service quality and user satisfaction at Machakos University, Kitui Campus Library, Kenya. *International Journal of Current Aspects*, *6*(2), 1-10.

[34] Kreuzer, M., Cado, V., & Raïes, K. (2020). Moments of care: How interpersonal interactions contribute to luxury experiences of healthcare consumers. *Journal of Business Research*, *116*, 482-490.
[35] Krücken, G. (2021). Multiple competitions in higher education: a conceptual approach. *Innovation*, *23*(2), 163-181.
[36] Lassleben, H., & Hofmann, L. (2023). Attracting Gen Z talents: do expectations towards employers vary by gender?. *Gender in Management: An International Journal*, *38*(4), 545-560.
[37] Lotfy, M. W., Kamel, S., Hassan, D. K., & Ezzeldin, M. (2022). Academic libraries as informal learning spaces in architectural educational environment. *Ain Shams Engineering Journal*, *13*(6), 101781.
[38] Mamta, & Kumar, V. (2024). A systematic review of library service quality studies: Models, dimensions, research populations and methods. *Journal Of Librarianship And Information Science*, *56*(2), 534-546.
[39] Mirghafoori, S. H., Sayyadi Tooranloo, H., & Saghafi, S. (2020). Diagnosing and routing electronic service quality improvement of academic libraries with the FMEA approach in an intuitionistic fuzzy environment. *The Electronic Library*, *38*(3), 597-631.
[40] Mohezar, S., Jaafar, N. I., & Akbar, W. (2021). *Achieving Quality of Life at Work*. Springer Singapore.
[41] Nzumile, J. M., & Taifa, I. W. (2021). Stratification of students' satisfaction requirements using the Kano model.
[42] Potra, S., Bogdanovici, L., Baluti, D., Pugna, A., & Sima, D. (2024). Refining the HWWP model by merging the Kano model's customer requirements with AHP's specialist hierarchy for new product design. *Procedia Computer Science*, *242*, 773-780.
[43] Rane, N. L., Achari, A., & Choudhary, S. P. (2023). Enhancing customer loyalty through quality of service: Effective strategies to improve customer satisfaction, experience, relationship, and engagement. *International Research Journal of Modernization in Engineering Technology and Science*, *5*(5), 427-452.
[44] Rasheed, R., & Rashid, A. (2024). Role of service quality factors in word of mouth through student satisfaction. *Kybernetes*, *53*(9), 2854-2870.
[45] Raza, S. A., Umer, A., Qureshi, M. A., & Dahri, A. S. (2020). Internet banking service quality, e-customer satisfaction and loyalty: the modified e-SERVQUAL model. *The TQM Journal*, *32*(6), 1443-1466.
[46] Riady, Y., Sofwan, M., Mailizar, M., Alqahtani, T. M., Yaqin, L. N., & Habibi, A. (2023). How can we assess the success of information technologies in digital libraries? Empirical evidence from Indonesia.*International Journal of Information Management Data Insights*, *3*(2), 100192.
[47] Santhoshkumar, F., Jeyarajasekar, T., & Kumar, S. S. (2022). Kano's Model for Customer Satisfaction Analysis of A Hospital. *International journal of health sciences*, (I), 11081-11089.
[48] Shahzad, K., & Khan, S. A. (2023). Effects of e-learning technologies on university librarians and libraries: a systematic literature review. *The Electronic Library*, *41*(4), 528-554.
[49] Twum, K. K., Adams, M., Budu, S., & Budu, R. A. A. (2022). Achieving university libraries user loyalty through user satisfaction: the role of service quality. *Journal of Marketing for Higher Education*, *32*(1), 54-72.
[50] Ullah, A., & Usman, M. (2023). Role of libraries in ensuring quality education at higher education institutions: a perspective of Pakistan. *Inverge Journal of Social Sciences*, *2*(4), 13-22.
[51] Wang, J., Yuan, R., & Shi, H. (2022). Quantitative representation of perception and evaluation method for service quality in university library under 4-D space. *Library hi tech*, *40*(1), 3-17.
[52] Winata, A. P., Fadelina, R., & Basuki, S. (2021). New normal and library services in Indonesia: A case study of university libraries. *Digital Library Perspectives*, *37*(1), 77-84.
[53] Wong, W. H., & Chapman, E. (2023). Student satisfaction and interaction in higher education. *Higher education*, *85*(5), 957-978.
[54] Xiao, Z., Mayusoh, C., Inkuer, A., & Puntien, P. (2024). The Research on Creative Design of Bai Architectural Decoration Patterns in Jianchuan Based on KANO Model Analysis. *Journal of Roi Kaensarn Acadami*, *9*(4), 245.
[55] Ylipulli, J., Pouke, M., Ehrenberg, N., & Keinonen, T. (2023). Public libraries as a partner in digital innovation project: Designing a virtual reality experience to support digital literacy. *Future Generation Computer Systems*, *149*, 594-605.
[56] Yu, K., & Huang, G. (2020). Exploring consumers' intent to use smart libraries with technology acceptance model. *The Electronic Library*, *38*(3), 447-461.