

Sustainable Interactive Information Hub Design

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Abstract

Library designs have evolved throughout the century as buildings that not only housed reading materials but also as a place for acquiring knowledge and learning. However, with the availability of the information technology and the internet where anything and everything is within the reach of everyone and anyone, the need and role of libraries is being questioned. The current situation in Malaysia indicates that there are a decreasing number of library visitors as well as a decreasing number of Malaysians who are engaged in reading. Thus there is the need to rethink the role and function of future libraries if libraries are to remain relevant. Needs of the new generation can be addressed through a sustainable library design that incorporates traditional and innovative library functions and programs. The goal is to make libraries being seen as more than just a library and a building that houses reading materials. This paper discusses the possibilities of libraries being a community building which further expands its functions as a social and cultural activities area. The issues that are tackled in this paper are based on the design functions of sustainable libraries and the additional activities that can be incorporated, the library image visually and the library spaces that will encourage social interactions. Mix-methods methodologies with case studies, interviews and questionnaires were used to gather data where the focus of the data gathering was on gaining relevant information and better understanding on the potential designs of modern public libraries and innovative library program. Synthesis of the new data and existing information was used in discussing potential functions and design elements of sustainable modern libraries design that would attract the current generation of internet and information technology. Based on the synthesis and adaptations, suggestions were put forward in terms of the spatial design layout, the new building program to be adapted and the architecture that should be applied in future sustainable libraries. The outcome of this research is the design and layout of a public library that is a sustainable Interactive Information Hub.

Keywords: Sustainable Facilities, Spatial Library Layout Design, Functions, Image.

1. Introduction

This paper will discuss the current research on library designs in Malaysia and the architectural design solutions that can be done to increase the numbers of visitors to Malaysian public libraries. The decreasing numbers of library visitors in the whole of Malaysia has raised concerns for the Malaysian government to take initiatives in stepping up its reading campaigns for the year 2010 by launching 1 Malaysia Reading Program [5]. This is major issue when facilities are provided for usage but Malaysians are not reading enough because of reasons other than inadequate facilities such as the culture of reading, the variety of reading materials and such. This situation has many possible factors and they will be discussed further in this paper on the architectural solutions and the building aspects of the library. Thus, the research will continue to achieve the aims and objectives of the study. This research paper is only on public libraries and community libraries as these typologies cater to the users of the community. The research will not cover other library typologies such as research libraries or university libraries in depth due to the different target users of the other libraries.

2. Objectives

The objectives of the research are divided into two main objectives, such as;

- i. To study the characteristics and factors of modern library architecture behind the decreasing number of library users.
- ii. To design interactive library to encourage users to utilize library facilities through interactive functions, easy access inside the library, attractive and interesting building exterior.

3. Literature Studies

In a nutshell, a library is the place for finding reading materials of all kinds to read and to refer to. Library designs have evolved from the traditional library programs to the more modern library program and design [7,8,13]. Sustainability of building design were the same either it is heritage or new building. On the engineering aspect some building maintenance consideration should be included in the design of new building [1,2] beside thermal comfort for reading books and articles. The new generation expects more from a library than what was expected back in the old days of hardbacks and manuscripts. The new age design requires a study on the reading habits of the current generation and the solution to provide the best reading environment of the modern library.

4. Library History Timeline

Libraries were vast and complex in almost all of the Muslim civilizations and many texts deciphered from other languages and other civilizations were also kept in their libraries. Figure 1, shows the timeline of library history and development throughout the years.

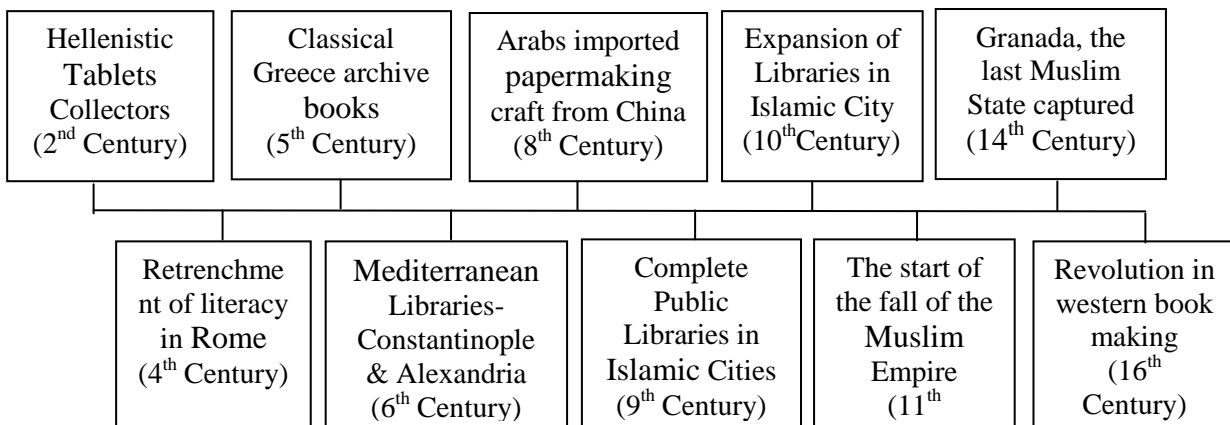


Figure 1: Timeline of Library History and Development throughout the years [9][11][12][14]

Where by the three greatest libraries in the Islamic civilization are the Library of Abbasid Caliph in Baghdad or also known as Dar al Hikmah, Library of Fatimid Caliph in Cairo which is also called as Dar al Ilm and the final library is the Library of Umayyad Caliph in Spain or better known as Library of Cordova. Knowledge was just as important as understanding religion in the Muslim world and gaining knowledge was also a way of showing one's social status. During their heightened periods of glories, these libraries were the centre of knowledge around the world [3]. Many westerners would flock to the Muslim cities in order to learn from the Muslim scholars and become their disciples.

5. Library Typologies in Malaysia

Typology is the study of types. More specifically, it may refer to the classification of characteristics common to buildings or urban spaces [15]. Typology in library planning and architecture is the taxonomic classification of characteristics commonly found in library buildings such as intensity of development,

degrees of formality, and school of thought (for example, modernist or traditional). Table 1, shows the total number of libraries in Malaysia according to CDNL-AO 2010 [4].

Table 1: Total number of libraries in Malaysia according to CDNL-AO 2010 [4]

NO.	TYPE OF LIBRARIES	TOTAL
1	National Library of Malaysia	1
2	Public libraries / State libraries	312
3	Rural libraries	1,089
4	Special Libraries	
	- Government (493) and Private Sector (174)	667
5	University libraries	
	- Government (20) and Private University/College/ Institution (346)	366
	Total number of libraries	2,435
6	School libraries	9,825
	Total	12,260

6. Malaysian Library Issues

The number of visitors to the National Library Malaysia for the year 2009 stands at a total of 413,735 showing an increase of 8.9% compared to the year 2005 (379,831) comprising of 309,562 (74.8%) adults and 104,173 (25.2%) children [4]. Figure 2 shows the statistics of visitors to National Library of Malaysia.

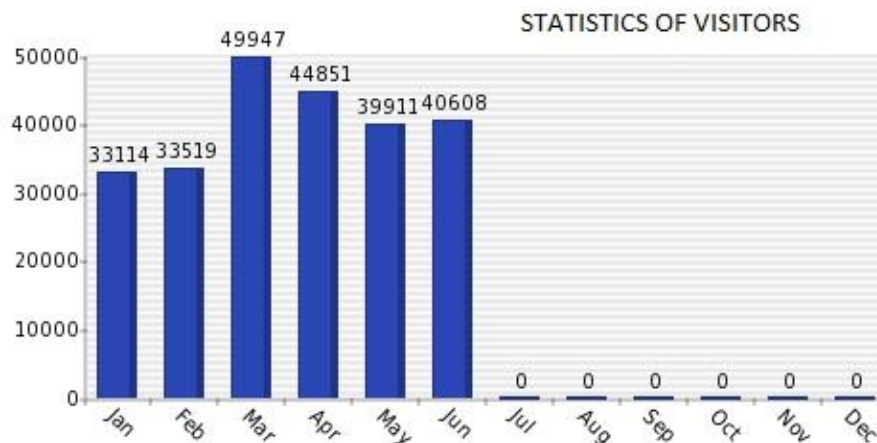


Figure 2: Statistics of visitors to National Library of Malaysia

However, in the year in 2010, for the past six months, there is a steady decrease of visitors to the National Library of Malaysia. The numbers are constantly fluctuating with an increasing and decreasing number of visitors because most of the visitors are from international tourists and not the local users. From random interviews done to the visitors, the National Library has a few critical problems which hinder visitors from making continuous trips to the library. Location is a major problem because of the lack of public transportation. Second, the reading materials provided are not varied and the formal reading environment does not create a feeling of belonging as most visitors will only come in to find their books and leave.

7. Library Users

The library users that were observed in the National Library and the Kuala Lumpur Library ranged from school children, young adults, adults and the elderly with young adults monopolizing the numbers. The estimated visitors daily vary depending on the time of the day, the day of the week and the occasions being held in the library. The users are mostly visiting to return books and to find new books to borrow without stopping to use the provided reading areas. Only a minority of the users, who are young adults, are using the

reading areas as a place to study. However, this is also the reason why there are less users visiting the library due to the induced formal setting of the library which does not allow talking, being noisy or making sounds. Therefore, the users that go to the library to read are going for the formal environment that they need and the rest of the users does not conform to the idea of a formal setting as a place to relax or unwind.

8. Malaysian Reading Habits

The Malaysian reading habits can be summarized into the diagram below as in figure 3, where the four major reading places meets the requirements sought after by the readers and visitors. The main reading places are at the library, bookstores, and newspaper stands where the four factors that influence the choice of reading areas are the informal setting, leisure reading, interest and hobbies and most importantly is the free reading provided.

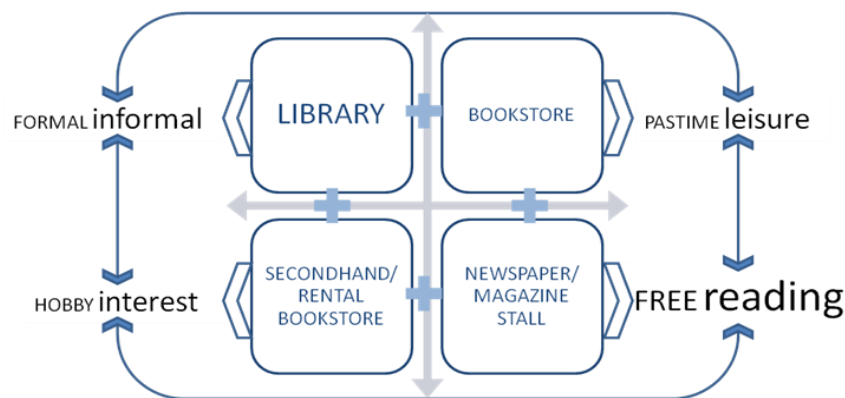


Figure 3: Factors influencing Malaysian reading habits

9. Government Initiatives to Promote Reading in Malaysia

For the year 2010, the government has stepped up its' game plan in ensuring the reading culture is instilled in all of Malaysia's residents by launching the 1 Malaysia Reading Campaign December last year [5]. The campaign, led by newly appointed Dato' Michelle Yeoh as the reading ambassador of 1 Malaysia, was launched in Kuala Lumpur as an initiative to promote reading and to increase literacy among Malaysians. As ranked by UNESCO, Malaysia is 11th place among 12 countries in the ASEAN and Asian Pacific areas as a nation with low literacy numbers among the other nations. Therefore, the reading campaign was launched in hope that Malaysians will read more and will seek more knowledge by reading more. Moving libraries have been started as an ongoing program to promote reading and it has been a success among the younger generation. Furthermore, mini libraries are being installed in shopping malls as a way to attract people to read in libraries [5]. The first being in Negeri Sembilan, the mini library is aimed at attracting the younger generation in hopes of instilling in them a reading culture from a young age.

10. Research Methodologies

The research methodologies that carried out in this research paper are precedent studies, case studies and survey questionnaires. The precedent studies are studies of good and bad examples from international library projects. Case studies were studied from the Malaysian library examples which will also include good and bad examples in Malaysia. The survey questionnaires were then handed out to the users of the surrounding vicinity which includes users from the residential areas, shopping complexes, offices and the commuter train station.

Methodology 1: Precedent Study

The first methodology applied in this research is precedent studies of selected international libraries. The chosen libraries are studies based on three (3) elements or characteristics of architectural design based on the research's objectives. These elements are the library's planning, functions and building image. Specific design considerations are studied in order to find out what are the best design features and elements that can

be used in the future library designs and to compare the current library designs in Malaysia. This concludes the need for a better library design in Malaysia and the design elements that can be used in the final design thesis. The figures below demonstrate how simple applications can give a big impact and which Malaysian libraries have yet to introduce.



Figure 4: Creative reading environments encourage creative thinking in children
(*Children's Library, SAKO Architect*)



Figure 5: Interactive features on floors and walls create a fun and interactive environment for both children and adults.



Figure 6: Expression Corner / Mini Stage Area to allow for creative self expressionism and social interactions



Figure 7: Creative book racks which are visually appealing yet still functional and easy to browse

The case studies that are done based on local libraries which are mainly prominent libraries located in Kuala Lumpur and the surrounding areas. Some of the selected libraries are the National Library in Kuala Lumpur, the Kuala Lumpur Library and the Kuala Lumpur Children's Library. The libraries chosen for the case studies are based on the good and bad qualities of their design, planning and image of the libraries. The different types of categories of libraries chosen are due to the need for data of comparison between the different libraries and the facilities needed and provided by each library.

Methodology 3: Survey Questionnaire

The final step in collecting data for the research methodology is by conducting surveys through questionnaires to the target respondents at the site at Section 16, Subang. The samples are users of the nearby residential areas such as Saujana Residence and Section 16 housing area, Subang Parade shoppers, Malaysian Railway users and commuters, office workers and nearby institutions. These five target groups for the survey are chosen to find out their opinions on the current libraries provided, their usual visiting rate and frequency of visits and other library issues. The data will show the reasons for the current state of Malaysian visitors and their perception of the libraries provided for them. Therefore, the chosen target groups gave a wide range of answers according to their experience during their visits, at which libraries and their view of the current library situation. This inevitably helps the research to answer all of the objectives to find out what makes a good library of the 21st Century.

Design Brief and Development

The design brief and development focuses on the design needs of the building for the completion of the Sustainable Interactive Information Hub. The library design has to tackle the issues discussed in the earlier section such as spatial zonings, reading environments and library image. The discussions in this section will help mould the building as required by the client, the authorities and most importantly by the creativity of the designer.

Building Typology

The Interactive Information Hub is categorized as an institutional building with the library as the core functioning activity. The library has a small percentage of retail outlet shops that caters to the needs of users by providing materials related to reading and others. The other functioning spaces of the library include book cafes that serve the public food and coffee and also reading spaces.

Schedule of Accommodation

The schedule of accommodation refers to the required spaces needed for the design of the library which is appropriate and according to the guidelines and standards of the local authorities. Table 2, shows the Schedule of Accommodation that shows the buildup spaces within the library. Based on the guidelines stated by the International Federation of Library Association (IFLA) the population number of the area, the approximate number of users and the size of the library can be determined.

NO	SPACES & ROOMS	UNITS	AREA (m ²)	TOTAL (m ²)	REMARKS	
1	CORE FACILITIES	LIBRARY				
		Administration				
		Management/Finance Office	1	200	200	Space for 19 library staff with approx. 12m ² per officer
		Library services: Main entrance/lobby/counter	1	100	100	Availability of service counter, information counter and circulation counter i.Easy Disable access from main entrance
		Waiting area	1	100	100	
		Borrowing counter	1	100	100	
		Children's area				
		General space	1	300	300	Little Reader's Corner allows up to 40 children per story telling time i.Safety measure highly considered for wellbeing of children ii.Spaces for pay area located far from quiet area for privacy concern for other readers
		Catalogues	1	200	200	
		Junior fiction/non fiction	1	1000	1000	
		Little Reader's Corner	1	100	100	
		Children's Librarian Administration	1	50	50	
		Adults area				
		Disabled area	1	200	200	Availability of disabled person services and universally designed bookshelf units New newspapers and magazines provided per issues printed within newspapers and magazine section. ii. Non-fiction and fiction books available in a variety of subjects located within thematic reading spaces to allow for freestyle reading environments.
		Reading area				
		AV area	1	150	150	
		Catalogues	1	300	300	
		Thematic Reading Area	1	200	200	
		Newspaper and Magazine Section	1	300	300	
		Periodicals Section				
		Young Adult Section	1	200	200	
		Adult Fiction Collection	1	300	300	
Adult Non-Fiction Collection	1	300	300			
Computer area	1	200	200	Internet and Wi-Fi allowance for users within computer laboratory with printing services		
Exhibition/display area	2	100	100	Located on ground floor for pedestrian attraction and top floor for official functions and activities with sufficient space for exhibition and exhibit storage.		
Toilet (male)	1	40	40	Divided with the two library blocks		
Toilet (female)	1	40	40	Divided with the two library blocks		
Toilet (disable)	1	6	6	Unisex disabled toilet services divided with the two blocks		

NO	SPACES & ROOMS		UNITS	AREA (m ²)	TOTAL (m ²)	REMARKS
		Multipurpose room	1	8	8	
		Staff lounge	1	100	100	Located on ground floor with easy access from work area with provisions of pantry, locker rooms and seating areas
		Self Service Book drop	2	100	200	On ground floor of both library blocks
		TOTAL FLOOR AREA			5094	
2	SOCIAL INTERACTION FACILITIES (new)	Mini Stage Poetry & Live Performance	1	200	200	For public expressionism and delivery of opinions or hobbies with the provision of a piano
		Art Corner	1	50	50	For children and adults who are into art with facilities for making art projects
		Music Corner	1	100	100	CDs, DVDs and music tapes to listen with headphones for new and old music genres
		Children's Play Area	1	60	60	Play area for children with a safe environment with educational toys and playground
		Green Reading Area	3	300	900	Rooftops of library blocks and green floor that connects both blocks with green turf
		Reading Pods	6	6	36	Small cocoon-like spaces for private reading in the comfort of a private pods with outdoor views
		TOTAL FLOOR AREA			1346	
3	SUPPORTING FACILITIES	Bookstores				
		MPH	1	1500	1500	Retail bookstores for buying reading materials and stationeries
		Borders	1	1500	1500	
		Popular	1	1000	1000	
		Book cafés				
		Starbucks	1	300	300	Places for retail cafes for staff and readers with appropriate water supply, direct services dumbbell for deliveries and suitable number of seating for users
		Old Town	1	300	300	
		Outdoor Amphitheater	1	300	300	Appropriate number of seating with mini stage for official functions or just for reading that is open for users on ground floor
		Musolla	2	10	20	Separate men's and women's musolla with ablution areas
		Toilet (male)	2	20	20	Divided within both blocks
		Toilet (female)	2	20	20	Divided within both blocks
Toilet (disabled)	1	6	6	Unisex disabled toilet divided within two library blocks		
TOTAL FLOOR AREA			4966			
4	SERVICES	Services Area				
		Loading dock	1			
		Air conditioning system				Depends on floor area and no. of storey
		Chiller water pump room	1	120	120	
		Plant room	1/floor	10	10	
		Building transportation system				Numbers depends on the amount of elevator shafts
		Elevator (guest)			6.5	
		Elevator (services)			7	
		Elevator (firefighting)			6.5	
		Lift motor room			15	
		Electricity				Must have direct access to road
Sub switch	4	24	96			
Main switch	1	80	80			
Generator room	1	50	50			
Water supply				Placed at basement with other services		
Water Tank room	1	150	150			
Fire fighting system				To be located at each floor near to the fire		

NO	SPACES & ROOMS	UNITS	AREA (m ²)	TOTAL (m ²)	REMARKS	
	Hose reel	1	36	36	escape staircases	
	Wet riser room	1	25	25		
	Store Room	8	4	32		
	Data communication: PABX	1	15	15		
	Operators station	1	8	8		
	TOTAL FLOOR AREA			657		
5	CIRCULATION	Guest Car Park	366	9	3294	20% of Library Circulation
		Staff Car park	20	9	180	
		Disable	10	1.1	11	
		Motorcycle Park	50	0.5	25	
		TOTAL FLOOR AREA			3510	
		TOTAL GROSS AREA			15573	

Table 2: Schedule of Accommodation that shows the buildup spaces within the library

Design Development (Planning)

The design development of the Sustainable Interactive Information Hub shows a continuous development and exploration of library planning through different approaches such as designing indoor gardens, providing courtyards and green rooftops and also exploring the urban context connectivity to the library.

Design Concept and Site Planning

Some of the important design standards of library design involved guidelines on spatial planning and ergonomics in libraries [10]. The most important part of library browsing is the isle and bookcases layout that will enable users to find their reading materials without any complications. Design standards also include way-finding within libraries to improve user circulation and ease movements within the library. Table 3, shows the Conceptual design and application of concept for Sustainable Interactive Information Hub.

Design Concept	Conceptual Application	Synthesis
<p style="text-align: center; color: magenta; font-size: 2em;">INTERLACE</p> <p>THE CROSSING OF PEOPLE FROM MANY DIFFERENT BACKGROUNDS UNDER ONE BUILDING: IN THE HYBRID LIBRARY</p> <p>THE CONCOCTION OF EVERYDAY LIFE ->THE MEETING PLACE: KNOWLEDGE, FUN & RELAXATION</p> <p>THE LIBRARY ACTS AS A PLACE TO MEET FRIENDS, READ BOOKS AND ENJOY MUSIC AND FOOD</p>	<p>1</p>	The site as one block of space and form was the start of the building design
	<p>2</p>	The existing shortcut used by pedestrians that cuts through the site is used as an axis to determine the building form
	<p>3</p>	Preserve the natural pedestrian path and form building around the path which splits building into two
	<p>4</p>	Allow for inward looking courtyards for reading through voids within the two library blocks
	<p>5</p>	Increase relief and recess within building design to allow circulation, sunlight penetration and natural wind flow through site and to allow direct view from the main road towards the library

Table 3: Conceptual design and application of concept for Sustainable Interactive Information Hub

Design Development of Spatial Layout of Interactive Information Hub

Table 4 shows the Design Development of Spatial Layout of Interactive Information Hub. This conceptual zoning is very important before developing the actual design.

No	Design Development	Synthesis
1		<p>Proposal 1</p> <p>The conceptual zoning of proposal 1 is focused on a green area as the core of the building with the library facilities surrounding the core. This concept separated the administration area with the main library area through a <i>green link</i> that acts as a buffer zone and a visual appeal for the library. The link to the shopping mall continues the pedestrian passage below on the ground floor and brings the connection above on the upper floor.</p>

No	Design Development	Synthesis
2		<p>Proposal 2</p> <p>In proposal 2, the conceptual planning focused on a ‘ramp’ design for the core reading area which ramps up the library. Other facilities are surrounding the ramp area and the connecting link to the shopping mall leads directly into the ramp reading space.</p>
3		<p>Proposal 3</p> <p>In the third and final proposal, the focus is on the public spaces that can increase social interactions and activities thus the integration on many linkages that acts as a separator but also as a communal area. The linkages go from one area to another and also lead into the shopping mall adjacent to the site. This is the most appropriate and subtle design that does not disrupt the flow of the users or the pedestrians outside of the building.</p>

Table 4: Design Development of Spatial Layout of Interactive Information Hub

Floor Plans

The finalized design of the Interactive Information hub can be seen below in figure 8, which shows the completed design from master plan and the rest of the ground floor plan until the final fifth (top) floor plan of the library will be discuss in another research paper.

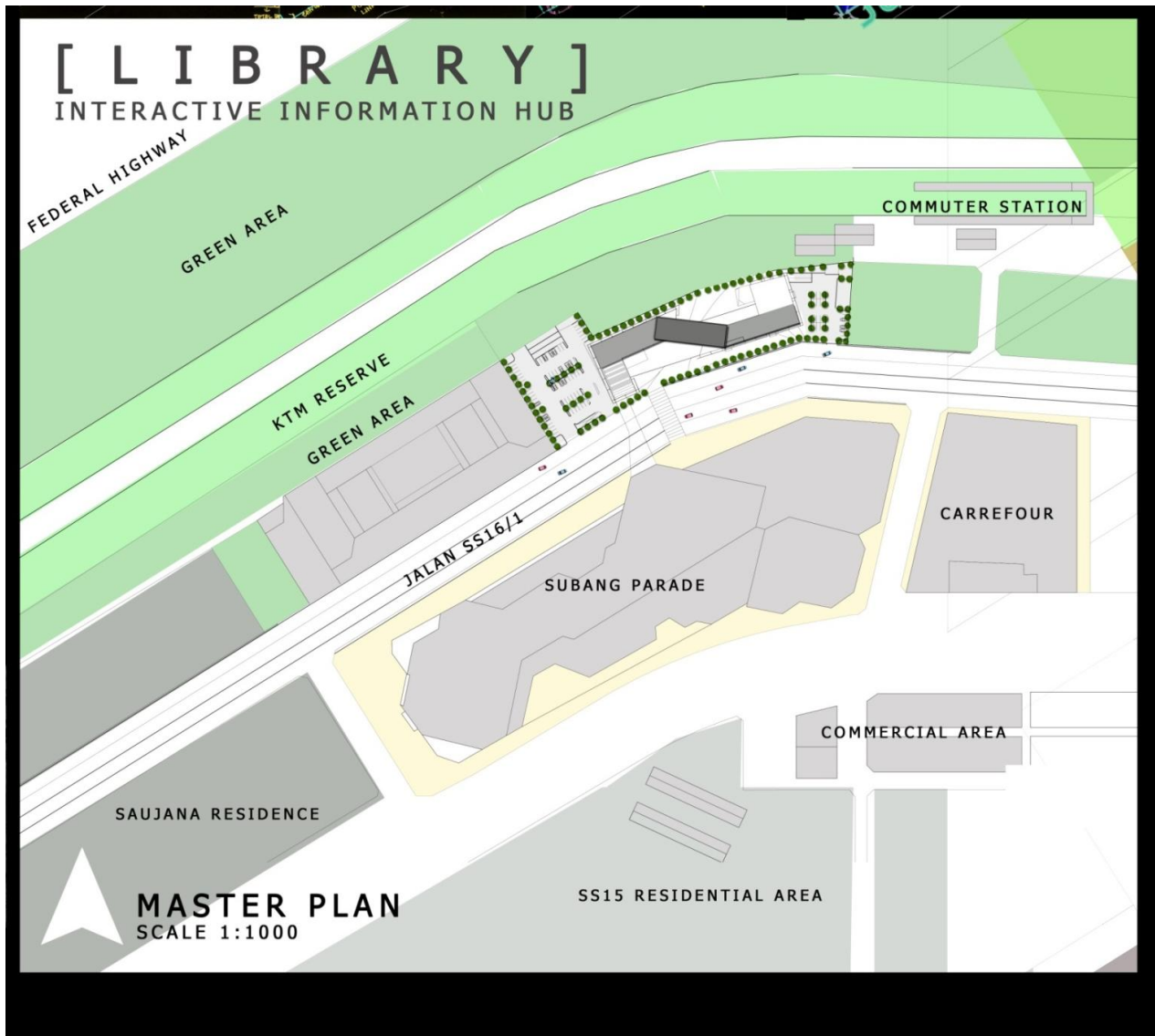


Figure 8: The master plan of the Sustainable Interactive Information Hub [6]

Design Issues

The design issues that were discussed and analyzed were synthesized with the final outcome of the design of the library. The issues of conventional library were discussed in previous sections and the design outcomes are illustrated below within different design focuses [16]. The design issues related to the usage of the library as a more informal space for the community with does not conform to the traditional planning and environment of conventional libraries. Therefore new and modern design solutions were the outcome of this study based on the problems of the conventional library designs such as lack of informal reading spaces, public facilities and new appeal for the users. The design issues are discussed further below;-

New Reading Environments

The reading environments that were applied used informal settings and allow user interactions while reading. The new thematic reading environments lets readers choose the type of reading spaces and settings they prefer which empowers the users to have choices and opinions [16]. Rather than conforming to the conventional and formal reading settings, ample of spaces are provided for social interaction and group activities whereas for people who chooses privacy, have a different area where they can go to.



Figure 9: Children's library with interactive design features to increase creativity and interests [6]



Figure 10: The connecting bridges' reading environment which allows user interaction from inside and outside of the library [6]

Pedestrian Friendly Design and Connectivity

The aim of the library design was to have a pedestrian friendly library which encourages users to drop by and browse a book or just to stop by the library and rest before going off to their destined places. This idea for the library makes the library as a stopping point for pedestrians which in turn will increase their interest in the reading materials provided in the library.



Figure 11: The users from the commuter station passing through the library as a way to increase user's interests and curiosity on the facilities provided in the library [6]



Figure 12: The node of the library which centres on users activities and social interactions in a modern library environment [6]

Design Development (Façade Treatment)

The design development of the façade treatments of the library design can be seen from the different approaches taken in terms of the concept and design elements incorporated. The difference between proposal 1 and 2 can be seen from the concept of the image, the architectural language and the form of the building.

Monumental

In the first design proposal, the concept was to bring a new landmark in the area and thus the form of the library was very structured and monumental. The aim was to make the building into an iconic structure at the site and also as a strong image when viewed from the Federal Highway.



Figure 13: The monumental image of the 1st proposal [6]



Figure 14: The monumental image of the 1st proposal which aimed at making the library a landmark [6]

Sustainable Green Design

The final design proposal incorporates green building innovations to make the library more user-friendly and environmentally friendly. Some of the sustainable green technologies incorporated are the usage of Autoclaved Aerated Concrete (AAC) panels integrated with stainless steel perforated panels, green rooftops and natural lighting and ventilation. The finalized design of the building responds to the need of the site and provides the facilities for user comfort.

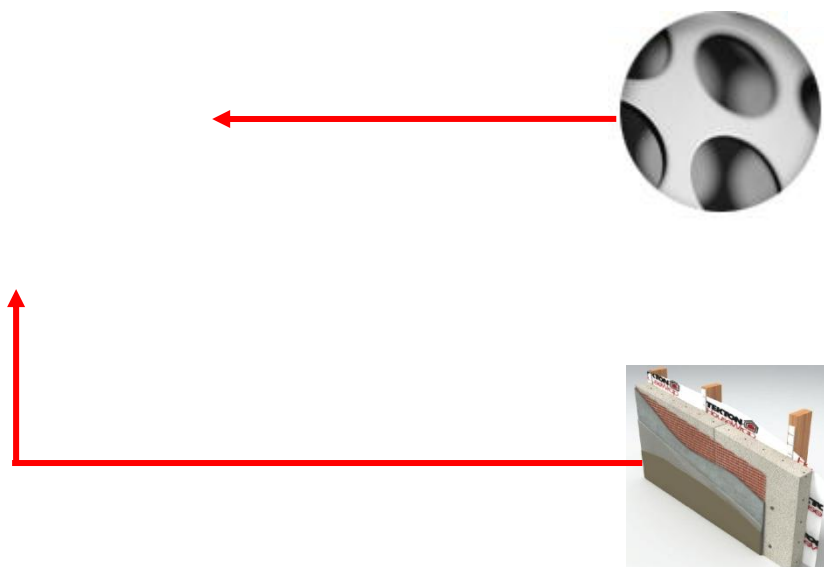




Figure 15: The green design implementation on the façade of the library using perforated panels and AAC panels [6]

Natural Lighting and Ventilation

The design of the façade allows natural lighting to penetrate the building towards the reading areas but minimizes unwanted glare from the sun through installation of perforated steel in between the Autoclaved Aerated Concrete (AAC) panels. The perforated panels also allow natural ventilation towards openings and reading balconies that are situated scattered across the front façade of the building. The natural ventilation is directed through openings at the façade of the library to the balconies and into the library.

Rooftop Garden

The usage of rooftop gardens is to allow readers to experience other reading environments different from indoor reading. Furthermore, rooftop gardens are also a good way of being environmentally friendly by reducing heat islands that are commonly found in urban areas. The green roofs are also a safe place for children to play at with the watchful eye of the parents and above the busy life of the city below. The largest green turf is on the 3rd floor which connects both library blocks into one large green roof that can be fully utilized by the users for reading, playing or having group activities.

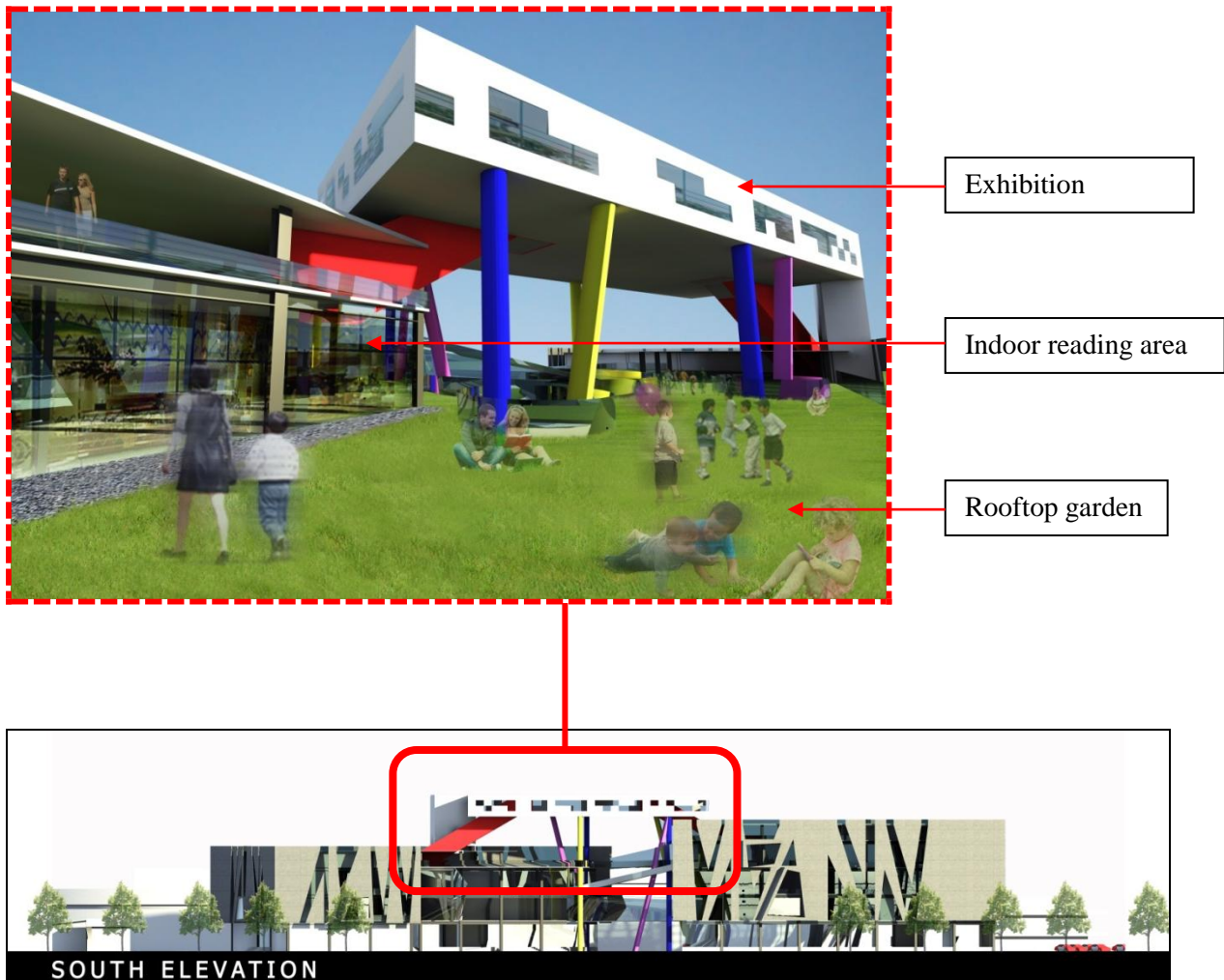


Figure 16: Location of Green Rooftops and Green Pavilion for outdoor reading area

Conclusion

The design of the library responds to the site in terms of the ecology, the climate and the geography of the site in relation to the users. This is important to ensure that the final outcome of the design is a building that is functional yet architecturally appealing. The design development process is important to determine the best possible outcome of the design that caters to the needs of the client, the users and the site. Design development is also a way of strategizing the initial design concept and evolving the design through many design ideas in order to produce the final product.

In a nutshell, this research paper has discovered the new possibilities of sustainable library design and planning through the innovations and creativity of new technologies. The characteristics and factors of modern library architecture behind the decreasing number of library users have been identified. Whereas through the second objective, the interactive library designs for encouraging users to utilize library facilities through interactive functions, easy access inside the library, attractive and interesting building exterior were developed. The most important part of the library which is the reading area is given a breath of fresh air by substituting the conventional reading spaces with a new approach of reading behaviours and reading styles. People no longer adhere to the constricting form of traditional reading behaviour but have evolved into many different styles of reading needs. A library needs to be more than just a place which houses reading materials but should be a part of the community and social interaction. This will be the evolution of the sustainable Malaysian libraries in the years to come.

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