

Analyzing Circulation Efficiency in Commercial Complexes: A Post Occupancy Evaluation Study in Kathmandu

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Abstract

Rapid urbanization in Nepal has led to a surge in the construction of multifunctional complexes catering entertainment, shopping, and socializing needs. Despite increasing, there remains a lack of research on their architectural aspects, particularly the design of circulation plans of commercial complexes. While professionals in the architectural and design fields acknowledge the pivotal role of circulation spaces in public buildings like commercial complexes, there exists a gap in evidence-based design in this realm. Addressing this gap, this research endeavors to investigate the impact of circulation plan forms within commercial complexes using the post occupancy evaluation (POE) tool which is used to assess how well a building or space meets the needs and expectations of its occupants after they are in use. In this case, it is to investigate how the circulation plan form affects the experiences and satisfaction of those using these commercial complexes and exploration of how the architectural layout and design of circulation plans within it can significantly influence the POE process. The study adopts an interdisciplinary approach, encompassing architectural analysis, user feedback, and field observation of two distinct commercial complexes that features the contextual mall culture with facilities of movies, entertainment, recreation, shopping and eateries within enclosed space with atrium. The survey was conducted using pedestrian flow and movement, wayfinding experience, spatial perception and comfort, user behavior and interaction, accessibility and inclusivity, safety and security and user preferences and satisfaction as variables for data collection. The result shows grid configuration with central open space has lesser visual access compared to linear configuration with central open space and its impact on comfort and experience of circulation space use of commercial complexes. Thus, visual connection and positioning of vertical means of circulation have been identified as major factor that should be considered for development of circulation plan form for commercial complexes.

Keywords

Post Occupancy Evaluation, Circulation, Plan Configuration, Commercial Complexes, Occupants

1. Introduction

Commercial complexes, comprising retail spaces, entertainment venues, and communal areas, represent vital hubs of economic activity and social interaction. Understanding the design and evaluation of these spaces is critical in creating environments that attract consumers, promote socialization, and ensure user satisfaction [1-3]. Post-occupancy evaluation (POE) stands as a fundamental approach in assessing the performance of commercial complexes. Sahito et al. [4] conducted a study exploring quasi-public spaces within contemporary commercial complexes in China. Their findings underline the role of these spaces in providing secure, well-maintained environments, promoting socialization, and increasing consumption. The design and layout of commercial complexes significantly influence consumer behavior and satisfaction. Zhu et al. [5] emphasized the importance of the traffic flow design within commercial buildings. They constructed an evaluation index system to assess traffic flow effectiveness. This perspective aligns with the design of commercial complexes, where efficient circulation patterns can enhance the shopping experience and boost consumer satisfaction.

P. Soobeen and Z. Shaoqing [6] investigated the impact of circulation layout on retail crowding perception within virtual indoor shopping malls. Their research highlighted the

substantial influence of circulation patterns on consumers' perceptions of retail crowding. The influence of cultural and regional factors on commercial complex design cannot be overlooked. N. Sahito et al. [4] explored quasi-public spaces in commercial complexes in China, revealing their contribution to social sustainability. This insight emphasizes the need to consider local cultural preferences and socialization patterns when designing commercial complexes to align with the specific context and culture of the users.

The trend of shopping malls in Nepal began with the establishment of Bishal Bazar in 1969, initially targeting foreigners but later becoming a favorite shopping destination for Nepalis. In recent years, Nepal has seen a significant increase in the construction of commercial complexes, driven by factors such as economic development, urbanization, and growing consumer spending power. These complexes provide modern shopping facilities, entertainment venues, and commercial spaces, catering to the needs of the expanding middle-class population [7].

The Complex Developers Leaser Association (CDLA) in Nepal has ambitious plans to transform Nepali cities into major shopping destinations akin to Singapore, Hong Kong, and Dubai, aiming to promote urbanization and market development [8]. Despite the growing trend of commercial complexes, there has been limited research conducted on various aspects related to these complexes within the context

of Nepal. Nepal is experiencing rapid urbanization and growth, especially in cities like Kathmandu and Pokhara. This necessitates a deeper exploration on various aspects of commercial complexes. Among different many aspects circulation spaces is crucial element for commercial complexes. Understanding the relationship between well-designed circulation spaces and business performance is vital, thus research is needed to investigate how such spaces contribute to customer flow, visitor engagement, and economic vitality within commercial complexes, ultimately supporting local businesses and contributing to the national economy. However, there is gap concerning evaluation of commercial complexes in Nepal, particularly focusing on circulation spaces. Thus, this study tries to assess the effectiveness of circulation design strategies, user satisfaction with its use, and the overall impact of circulation spaces on user experiences. This research is essential for the success of public buildings, as it provides insights into the existing scenario and helps inform architectural projects in future.

1.1 Circulation spaces of commercial complexes

Circulation in architecture involves the movement of people within and around buildings, aiding in the development of a mental map of the space [9]. It includes the creation of focal points and distinct circulation paths, employing variations in width, height, material, and color to facilitate comprehension of the circulation system [10]. Circulation serves as a means of communication between differentiated spaces and between the exterior and interior of a building [11].

The design of circulation spaces within these complexes is crucial as it can influence customer behavior, satisfaction, and loyalty. These spaces encompass corridors, escalators, and elevators, which impact the overall customer experience and purchasing decisions. Understanding and optimizing the design of circulation spaces are vital for businesses seeking to create spaces that resonate with their target customers. Studying the existing scenario of commercial complexes is essential to enhance user satisfaction, functionality, accessibility, flexibility, and economic success. Informed decisions about spatial organization can lead to improved user experiences and better business outcomes in commercial complexes.

Efficient circulation is essential for shopping centers, ensuring a favorable shopping environment [12]. The design of pathways within a floor plan has a significant impact on the success of the architecture, with circulation spaces needing to be as engaging as other elements of the building. It enables users to experience architecture in three dimensions and feel spatial satisfaction. Without movement, architecture remains visually pleasing but lacks a direct relationship with its users. In essence, circulation is a critical aspect of architecture, shaping how people interact with and appreciate the built environment [13].

1.2 Post occupancy evaluation context in Nepal

Expert architects, urban planners, interior designers, psychologists, sociologists and environmental designers have focused on human behavior in their research on physical environment and laid the foundation of post-occupancy

evaluation studies. Although such studies mainly concentrated on architectural structures from the past to the present, they expanded to cover evaluation of urban open spaces today including land pooling and development [14].

Post-Occupancy Evaluation (POE) as a formal methodology began to gain recognition and prominence in the field of architecture and design in the late 1960s and early 1970s. The origins of POE can be traced back to the work of researchers and practitioners who sought to understand the performance of buildings and assess their effectiveness in meeting user needs. The need for a systematic evaluation of buildings after they were occupied arose from the realization that many buildings did not perform as expected or failed to meet the requirements of their users.

Since then, POE has continued to evolve as a research methodology and has been applied in various fields, including architecture, interior design, facility management, and urban planning. It has become an integral part of evidence-based design practices, helping to bridge the gap between design intentions and actual user experiences. POE methodologies typically involve data collection through surveys, interviews, observations, and performance measurements to assess various aspects of a built environment, including user satisfaction, functionality, usability, comfort, and efficiency[15].

2. Study Method

The research adopts case study research method based on POE evaluation. This study employs an investigative approach, to demonstrate the application of POE to assess impact of circulation plan form of commercial complexes. A combination of multiple data collection techniques results in much clearer and focused POE findings adopting this approach. A structured questionnaire and behavioral mapping were used as the research instrument to investigate the use and activity pattern within the circulation spaces of the complexes. The observation components of the research methodology assist in understanding relationships and factors in the environment that are not noticed by the users of the spaces. Surveys are useful because they provide an efficient way to get the opinions of a lot of people in a standardized way. The results are also easily quantifiable, which can lend rhetorical weight to the conclusions of the study, when used in conjunction with insightful qualitative analysis.

Questionnaire for conducting a post-occupancy evaluation (POE) of circulation spaces in commercial complexes, were based on several variables to assess user experiences, satisfaction, and overall performance. Some identified variables from the literature are user satisfaction, flow and movement, wayfinding experience, spatial perception and, user behavior and interactions, safety and security and user preferences and adaptation. . For POE, survey was to undertaken for tenants and visitors. Since the number of shop (Population size) for both malls were known combined population of 318 shops were used to determine the sample size. Thus, ten number of sample sizes for tenant survey were undertaken at 80% confidence level with 20% margin error and population portion of 50%. Similarly, using the formula

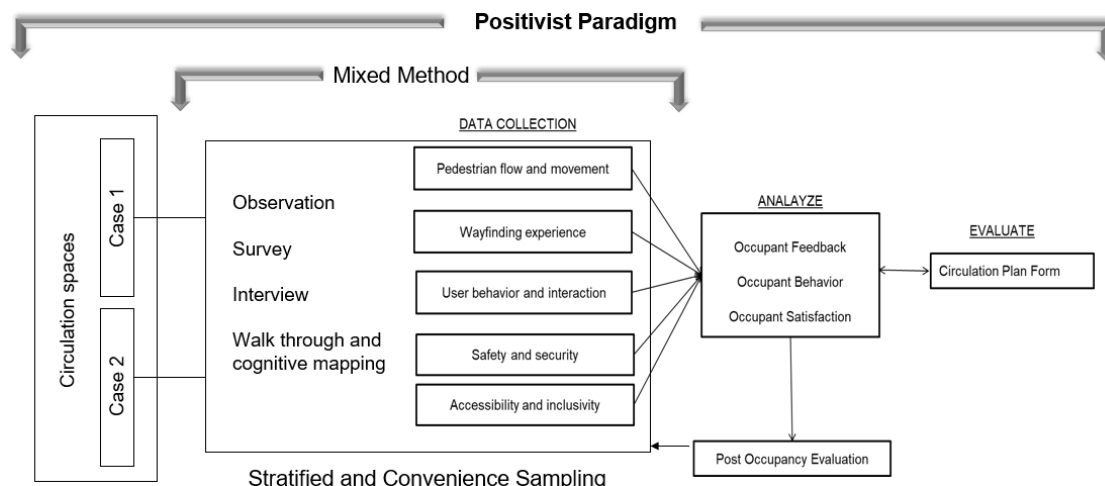


Figure 1: Framework of research design

for sample size for finite population at 80% confidence level with 10% error margin least required size was 41 for each case for visitor survey.

Data collection involved the meticulous observation of people’s movements and space utilization. The methodology encompassed behavioral tracking, recorded in a meticulously structured table adapted from Golicnik [9]. This behavioral mapping matrix was structured with rows and columns signifying distinct activities during the observation timeframe including both dynamic and static activities.

There are certain limitations to the study as only two-dimensional aspect of circulation configuration is being studied. This study undertakes relatively small sample size of commercial complexes included in the analysis due to resource and time constraints. Therefore, the findings may not be fully representative of all commercial complexes or applicable to different geographical context. The study is conducted over a limited time period, which may not capture long-term variations in user experiences and post-occupancy evaluations. Factors such as seasonal changes, evolving user needs, or modifications in the circulation plan form may influence perceptions differently over time.

3. Study Area

This study involved a contrast and comparison between two prominent commercial complexes in Kathmandu: Labim Mall and Civil Mall. The choice of these complexes was influenced by their shared attributes, including functional purpose, size, and diverse user demographics. Notably, Labim Mall had adopted a linear circulation plan, while Civil Mall had employed a grid circulation plan. This deliberate selection allowed for an examination of potential impacts stemming from distinct circulation plan configurations.

3.1 Case study of Civil mall




With the aim of providing a modern shopping and entertainment experience to the people of Kathmandu Civil mall was established in year 2006. The circulation plan form of civil mall is arranged in grid configuration layout where means of vertical circulation and corridors are organized in a

Table 1: General detail of case studies (Source: Civil management office and Labim management office)

	Civil Mall	Labim Mall
Opening date	2006 AD	2016 AD
Number of floors	Nine	Four
Architect	Prajwol Hada and Team	Team Quest
Opening Hours	10:00 am to 08:00 pm	08:00 am to 08:00 pm
Total number of shops	210	108
Shop types	Apparels, Accessories, Books, Cosmetics,Consultancies, Cooperative,Electronics, Entertainment,Footwears, School, Eateries	Apparels, Accessories, Cosmetics, Entertainment, Footwears, Eateries
Parking facilities	Two basement floors Four wheelers: 110 Two wheelers: 350	Two basement floors Four wheelers: 180 Two wheelers: 250
Footfall per day (In avg)	Weekdays: 4500 Weekends: 6000 On special occasion around 10000	Weekdays: 3800 Weekends: 5500 On special occasion around 9000
Others	Retail outlets, VR games, ATM outlets, Electric ride available on circulation space areas	Retail outlet, VR games available on circulation space areas

grid-like pattern, with perpendicular intersections forming a network. Spatial units in this type follow a certain coordination structure[13]. Upon entering from the lower ground floor, visitors encounter a spacious entrance area, akin to a lobby, where certain shops are visible. An escalator leads to upper floors, while staircases and lifts are less prominently featured from this vantage point. On the upper ground floor, visitors are presented with a more extensive view of the commercial complex, showcasing a larger array of shops. Notably, escalators are strategically placed for easy access. Additionally, this level features an open space accommodating a food court and small outlets. Each floor offers a total of nine accessible vertical circulation options, ensuring visitors have multiple choices for moving between levels. Dimensional details of the circulation spaces are as shown in table 2.


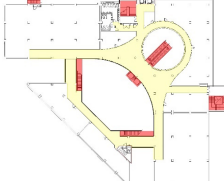
Table 2: Horizontal and Vertical Circulation area of Civil mall indicated by yellow color and red color respectively

Plan	Total Floor Area (sqft)	Horizontal Circulation Area (sqft)	Vertical Circulation Area (sqft)	Width of Corridor (ft)	
				Min	Max
 Ground Floor Plan	29,099.36	9,468.04 (32.5%)	1,726.06 (5.93%)	8	10
 First Floor Plan	25,302.16	6,609.80 (26.12%)	1,726.06 (6.82%)	8	10
 Second Floor Plan	25,463.56	6,229.91 (24.46%)	1,726.06 (6.77%)	8	10

3.2 Case study of Labim mall

Established in year 2016 AD, Labim mall is located at the heart of Lalitpur at the entrance of the historical Patan Durbar Square. Multiple access for pedestrian and vehicles, flushed ramp with footpath has created a barrier free entrance to the mall. Central atrium planning creates communicating relationships between spaces. Based on the organization of both horizontal and vertical circulation methods, the design of this complex is recognized as having a linear pattern. A linear layout is considered the fundamental type of circulation because it offers the maximum number of unobstructed straight-line views. Linearity can range from an orderly linear pathway to a more haphazard or axial arrangement. It can vary in terms of length, width, and other dimensions. The system can also vary in terms of having a single or multiple

Table 3: Horizontal and Vertical Circulation area of Labim mall indicated by yellow color and red color respectively

Plan	Total Floor Area (sqft)	Horizontal Circulation Area (sqft)	Vertical Circulation Area (sqft)	Width of Corridor (ft)	
				Min	Max
 Ground Floor Plan	34,996.27	13,917.91 (39.77%)	1,153.97 (3.29%)	5	25
 First and Second Floor Plan	26,347.33	6,351.74 (24.10%)	1,538.90 (5.84%)	5	13

circulation routes and whether its functional units are symmetrically organized [13]. Total number of vertical circulations from ground floor that are accessible to visitors are in total six numbers and in upper floors it increases to eight in numbers including fire exit. Other dimensional details of the circulation spaces are as shown in table 3.

4. Discussions and Findings

Observation of Civil mall was undertaken on 8th and 9th of Shrawan (24th to 25th July, 2023) and that of Labim mall was undertaken on 11th and 12th of Shrawan (27th to 28th July, 2023). A total of three observation spots were strategically positioned within both malls, affording comprehensive coverage of multiple areas that underwent for six hours of time period. The specific observation points for each mall are delineated in figures 2 and 3. The completed matrix from the field observation is exemplified in Figure 4.

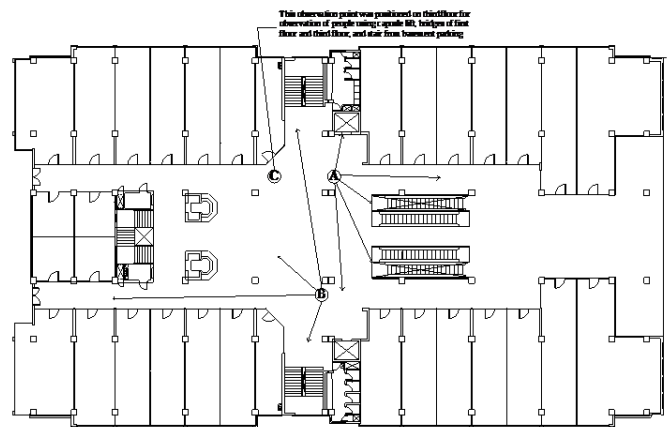


Figure 2: Point of observation at Civil mall with respective coverage for behavioral mapping matrix

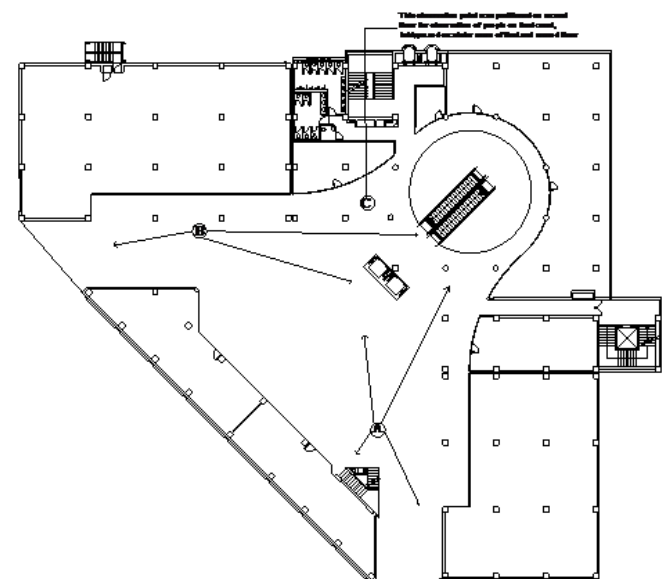


Figure 3: Point of observation at Labim mall with respective coverage for behavioral mapping matrix

The behavioral mapping matrix

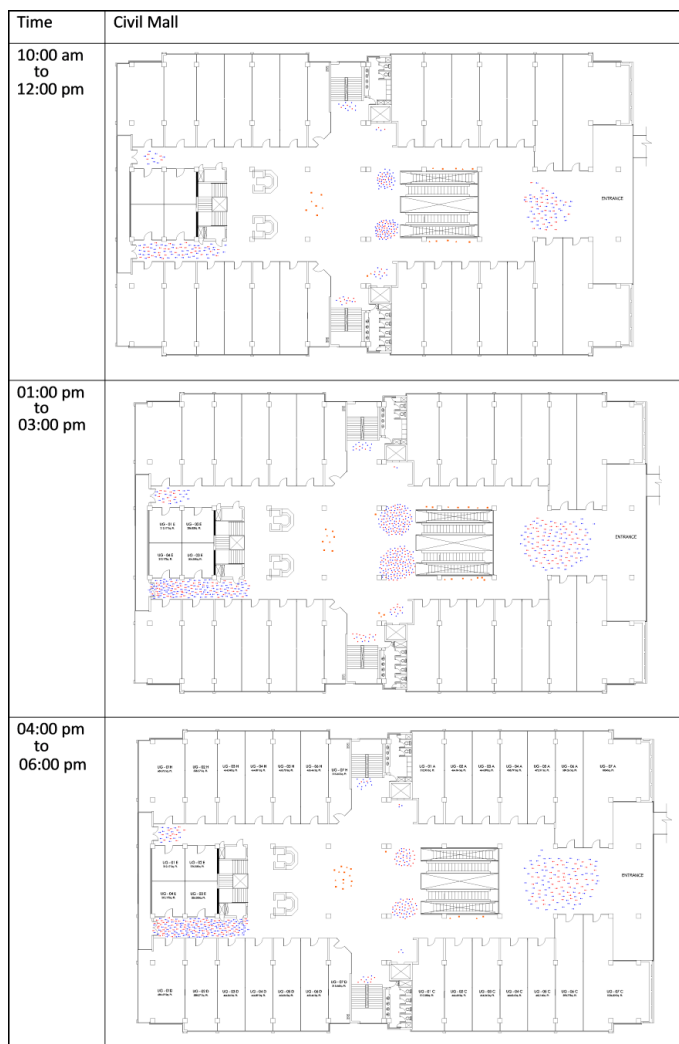
Weather condition: Area: Date 7/26/11 Time: 11:00 to 12:00
 Duration of entire observation: Temperature: Damp/Dry: Cloud/Sunshine:

Activity	Female	Male	Remarks
Food court/eating			
1st floor escalator			
2nd floor escalator			
Bridge			
1st floor in/out			
Bridge			
1st floor escalator			
Bridge			

Figure 4: The behavioral matrix with the recorded data (source: Golicnik,2005)

Subsequent to data collection, the accumulated information was harnessed for mapping purposes. This entailed the identification and cataloging of various behaviors, alongside their corresponding frequencies. The overarching objective was to elucidate their connections with specific locations and

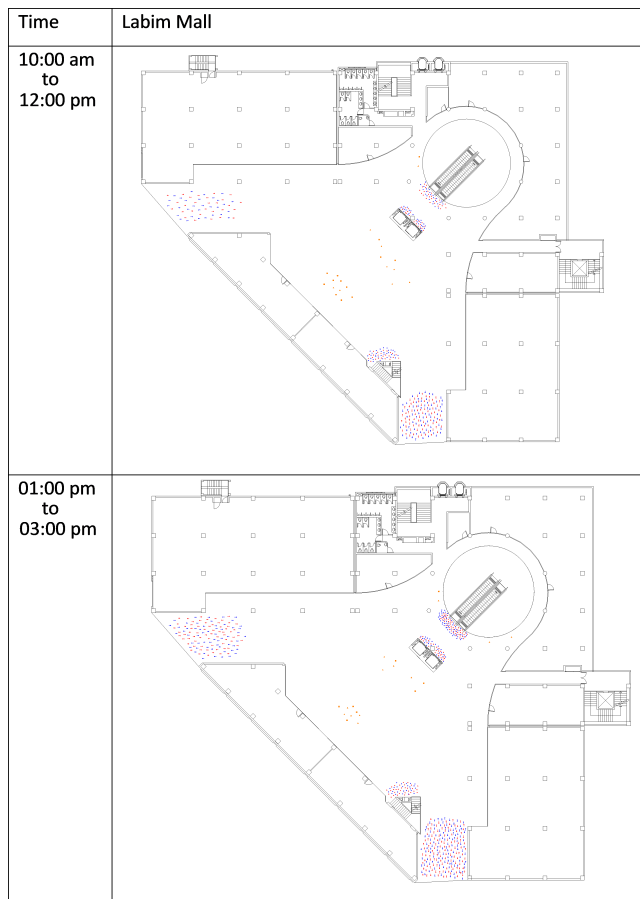
Table 4: Representation of a map transformed from a manually produced behavioural activities at ground floor of Civil mall



to unearth recurrent patterns that exhibited correlations with particular layouts and features. There is representation of both dynamic and static activities with color representation of Blue=male and Red=female. Also, static activity of female is represented by orange triangle while that of male is represented in orange rectangle. Rest depicts the dynamic activity with direction at the entrances. The final mapping with respect to time are as shown in table 4 and 5 for Civil mall and Labim mall respectively.

The data gathered from observations within Civil Mall and Labim Mall yields valuable insights into visitor behaviors, entrance preferences, and vertical circulation choices. At Civil Mall, we observed that certain areas, like Area B, saw a notable proportion of individuals engaged in static activities, suggesting these spaces may be conducive to leisure or relaxation. Gender disparities were evident, especially at the back entrance, indicating varying appeal to different genders. The upper floors had fewer visitors but a higher engagement in static activities, signifying distinct dynamics on different levels. The gathered data indicates that approximately 60% of visitors opted for the upper floors, where they tended to prolong their stay. At Labim Mall, similar trends were observed, with static activities at Point A and gender preferences at the main entrance. Visitors here also displayed a preference for escalators over lifts. Additionally, both malls experienced fluctuations in occupancy throughout the day, with peak hours during the afternoon.

Table 5: Representation of a map transformed from a manually produced behavioral activities on ground floor of Labim mall



For the visitor questionnaire survey, out of 300 distributed questionnaire total of 45 responses for Civil mall and 43 responses for Labim mall were received which meets the minimum requirement at 80% confidence level at 20% error margin. The frequency of answers for questions are as shown in table 5, 6, 7 and 8. In the table, each row represents a different question and the choices available for it, and the columns display answers in categories of male and female. The numbers in the table indicate the frequency or count of respondents who selected each particular answer or category for the respective question.

Table 6: General information

General information							
Question	Choices	Civil Mall			Labim Mall		
		Gender		Total	Gender		Total
		Female	Male		Female	Male	
Age	20-35	18	22	40	19	21	40
	35-50	1	1	2	0	2	2
	Under 20	1	2	3	1	0	1
From what distance you have come to visit this complex?	2-5 km	4	4	8	7	3	10
	5-10 km	12	15	27	9	15	24
	Less than 2 Km	2	2	4	2	1	3
	More than 10 km	2	4	6	2	4	6
How often do you visit this complex?	Many times a month	8	10	18	12	10	22
	Many times a week	0	1	1	0	1	1
	Very frequently	11	10	21	7	8	15
	Weekly	0	3	3	0	3	3
What in particular have you come here for?	Entertainment	7	6	13	7	9	16
	Movie	6	14	20	7	11	18
	Shopping	4	4	8	5	1	6
	Socialize	2	1	3	1	2	3

The provided data highlights key demographic and behavioral trends among visitors to commercial complexes. The complexes are particularly popular among young adults aged 20 to 35, with a higher male-to-female ratio. The majority of visitors live within close proximity, indicating local appeal and convenience. In line with the findings of article by Adetunji [12] and Wang [16], majority of visitors attracted to complexes are young adults and likely visit complexes for leisure activities as movie-watching ranks as the primary purpose for visits to both complexes.

Table 7: Usage pattern of circulation spaces

Pattern of usage of circulation spaces							
Question	Choices	Civil Mall			Labim Mall		
		Gender		Total	Gender		Total
		Female	Male		Female	Male	
From where do you usually enter the complex?	Basement parking	4	6	10	0	7	7
	Entrance from basement	4	4	8	4	2	6
	From other entrances	0	1	1	1	0	1
	Main entrance of Ground floor	12	14	26	15	14	29
What do you notice first when you enter the complex?	Means of vertical circulation	5	8	13	3	2	5
	Open space with food court	8	8	16	12	12	24
	Other elements (statue, water bodies, plantation, roof)	1	1	2	3	4	7
	Shops	6	8	14	2	5	7
	Which means of vertical circulation do you prefer?	Escalator	16	17	33	14	12
Just spend time on ground floor		0	0	0	1	2	3
Lift		4	7	11	5	6	11
Staircase		0	1	1	0	3	3

The results in Dogu's study [10] showed that there is an association between gender and frequency of visits to the shopping mall, with females visiting the shopping mall more frequently than males our results however revealed that there number of male frequent visitors were more compared to that

of female so this area of association needs to be analyzed further. Also it is notable that, Civil mall attracts frequent visitors, while Labim Mall sees those who visit multiple times a month, possibly due to location or unique offerings

Form the data collected in regard to pattern of usage of circulation spaces, it is evident that the main entrance on the ground floor is the preferred choice for the majority of visitors in both malls, highlighting its accessibility and prominence. However, Labim Mall experiences fewer visitors entering from the basement parking area compared to Civil Mall, indicating potential differences in parking facilities or the visibility of entrances. Visitors attention upon entering the malls varies, with Labim Mall visitors primarily noticing open spaces, while those in Civil Mall observe a more diverse arrangement that includes open spaces, vertical circulation areas, and shops. This distinction suggests that Civil Mall's design may provide a more visually engaging and multifaceted initial impression. The significance of open spaces catching visitors' attention underscores their role as attractive features in both malls, presenting opportunities for creating inviting areas for relaxation, socialization, or hosting events. Moreover, the data highlights the popularity of escalators as the preferred means of vertical circulation in both malls, reflecting their convenience and appeal. Interestingly, gender differences emerge in the choice of lifts, with male visitors showing a preference for lifts in Civil Mall, while an equal number of male and female visitors opt for lifts in Labim Mall. These variations may be influenced by factors such as accessibility, waiting times, or the design of these vertical circulation options.

Table 8: Effectiveness of circulation spaces

Effectiveness of circulation spaces of the complex							
Question	Choices	Civil Mall			Labim Mall		
		Gender		Total	Gender		Total
		Female	Male		Female	Male	
Did you find circulation spaces well connected allowing for easy movement between different sections or levels of the complex?	I did not notice any specific connections	4	2	6	1	2	3
	No, not well connected	0	1	1	2	3	5
	Yes, moderately well connected	14	17	31	8	14	22
	Yes, very well connected	2	4	6	8	4	12
How effective were the signage and wayfinding systems in helping you navigate the circulation spaces and find your desired destinations?	I did not notice any signage or wayfinding systems	5	7	12	7	6	13
	Moderately effective	8	9	17	10	9	19
	Somewhat ineffective	3	3	6	0	2	2
	Very effective	0	6	6	3	5	8
	Very ineffective	2	0	2	0	1	1
Is there any space or corridor where you feel uncomfortable/unsafe during your visit?	No	13	20	33	19	20	39
	Yes	7	5	12	1	3	4
If yes, Why?	Do not have proper visual connection	5	2	7	1	1	2
	Lesser traffic flow	0	1	1	0	0	0
	Narrower corridor	0	1	1	0	2	2
	No ample light	2	1	3	0	0	0

The data reveals several key insights into visitor experiences at Civil Mall and Labim Mall regarding effectiveness of circulation spaces. While most visitors find both malls moderately connected, Labim Mall stands out with a significant number of visitors describing it as very well connected, although a notable portion finds it poorly connected. Signage effectiveness is generally low, with few

visitors finding it very effective, and a substantial number not noticing signage at all. In terms of corridor comfort, most visitors report feeling comfortable, but Civil Mall has a higher number of visitors, especially females, feeling unsafe in certain corridor sections. Poor visual connection, corridor width, and lighting are cited as reasons for discomfort. The result aligns with the findings of article by Asya Natapov [13] where it has been mentioned that grid network is perceived as complex in connectivity with less visual appeal compared to linear configuration. From this, it can be inferred that configuration of Labim mall is more appreciated by the people than that of Civil mall.

Table 9: Activities along circulation spaces

Effectiveness of circulation spaces of the complex							
Question	Choices	Civil Mall			Labim Mall		
		Gender		Total	Gender		Total
		Female	Male		Female	Male	
Did you find circulation spaces well connected allowing for easy movement between different sections or levels of the complex?	I did not notice any specific connections	4	2	6	1	2	3
	No, not well connected	0	1	1	2	3	5
	Yes, moderately well connected	14	17	31	8	14	22
	Yes, very well connected	2	4	6	8	4	12
How effective were the signage and wayfinding systems in helping you navigate the circulation spaces and find your desired destinations?	I did not notice any signage or wayfinding systems	5	7	12	7	6	13
	Moderately effective	8	9	17	10	9	19
	Somewhat ineffective	3	3	6	0	2	2
	Very effective	0	6	6	3	5	8
	Very ineffective	2	0	2	0	1	1
Is there any space or corridor where you feel uncomfortable/unsafe during your visit?	No	13	20	33	19	20	39
	Yes	7	5	12	1	3	4
If yes, Why?	Do not have proper visual connection	5	2	7	1	1	2
	Lesser traffic flow	0	1	1	0	0	0
	Narrower corridor	0	1	1	0	2	2
	No ample light	2	1	3	0	0	0

The data provides valuable insights into the preferences and perceptions of visitors in the complexes, offering several noteworthy inferences. First and foremost, the primary purpose of visits revolves around activities such as window shopping and utilizing the available entertainment facilities, with a penchant for spending time in food courts. This highlights the complexes' role as leisure and entertainment hubs.

Furthermore, the choices of visitor activities predominantly lean toward static pursuits, encompassing activities like dining and capturing photos and videos. This inclination suggests that visitors seek relaxed and unhurried experiences within the complexes. In terms of visitor priorities, storefront displays that captivate attention emerge as paramount, closely followed by considerations such as ample lighting and the availability of sufficient seating areas. These elements significantly contribute to shaping the overall visitor experience, emphasizing the importance of their careful design and management.

Lastly, visitor preferences for specific complexes are illuminated by the data. Civil Mall earns favor due to its entertainment options and its convenient and accessible location, while Labim Mall garners appreciation for its enjoyable and comfortable indoor spaces, complemented by

its entertainment facilities and accessibility. These preferences reflect the significance of factors like ambiance, accessibility, and entertainment offerings in attracting and retaining visitors to these commercial complexes. In line with the article by Kyriaki Tsoukala, variety of activities available is the major attraction factor for complexes followed by accessibility and location of the complex [17].

Similarly, a comprehensive survey was conducted, encompassing a total of nine tenants from both Labim Mall and Civil Mall. This survey aimed to assess the perception of tenants regarding the circulation spaces within the malls and the subsequent impact on shopping activities. The findings from this survey shed light on the following aspects: Among the surveyed shops, 33.33% were situated facing atrium spaces and vertical circulation pathways, while 22.22% faced other amenities such as the main entrance corridor. Interestingly, the unanimous consensus (100%) among the tenants was that the circulation plan form of the complex indeed had a positive impact on customer flow and foot traffic near their shops. Among the various design features and elements present in the circulation spaces, 55.56% of respondents believed that visibility from circulation areas had a positive effect on customer navigation and accessibility to their shops. Additionally, 33.33% attributed the positive impact to the strategic placement of vertical circulation means, while 11.11% noted that an attractive storefront contributed to improved customer navigation. Additionally, every tenant (100%) shared the belief that an increase in foot traffic within the complex translated to increased sales for their shops. Also it was noticeable that the shops within the proximity of vertical means of circulation spaces met their daily target sale compared to other location of shops.

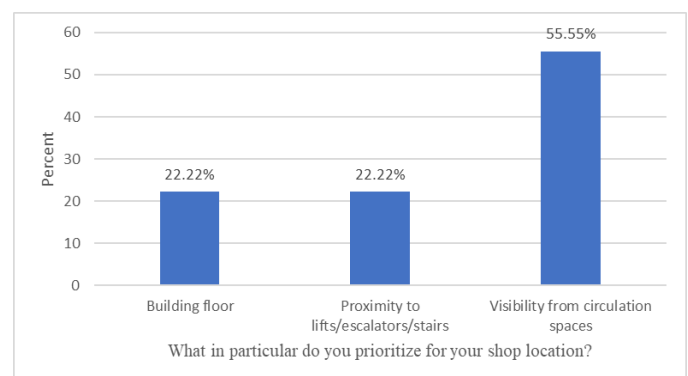
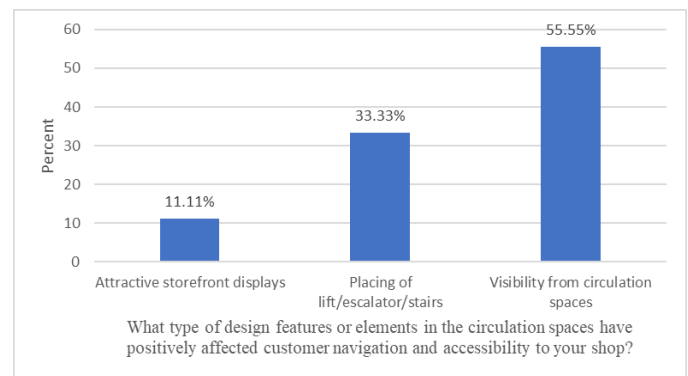


Figure 5: Tenants perception on various aspects of commercial complexes

When tenants were queried about their priority considerations for shop location, 55.56% emphasized visibility from circulation spaces as a critical factor. In contrast, 22.22% placed importance on the specific building floor their shop was located on, while proximity to vertical means of circulation was the preferred choice for another 22.22% of tenants. In summary, the survey's outcomes underscore the significant role circulation spaces play in shaping tenant experiences and commercial outcomes within these malls. The tenants' perspectives collectively emphasize the importance of strategic design considerations, visibility, and effective circulation planning in enhancing both customer navigation and overall business success.

Based on surveys conducted with both tenants and visitors, it is clear that the spatial layout significantly influences the overall evaluation of a commercial complex's user experience. However, when evaluating the effectiveness of the existing plan configuration through surveys and mapping, it becomes evident that the overall spatial experience and circulation of the complex differ notably between the grid configuration and the linear configuration. These findings underscore the impact of spatial design on how individuals perceive and interact within the commercial complex, highlighting the significance of thoughtful layout planning in optimizing the user experience

5. Conclusion

In conclusion, the comparison of Labim Mall and Civil Mall offers valuable insights into the dynamics of visitor behaviors and preferences within commercial complexes in relation to plan configuration of circulation spaces. It becomes evident that the design and layout of circulation spaces are pivotal in influencing key factors like footfall, dwell time, and overall commercial space experience and success. In assessing overall performance and satisfaction from visitors' perspective it is evident that linear configuration is better compared to grid configuration owing to visual connection and accessibility in evaluation of performance of commercial complexes.

In general, In both malls, a significant percentage of visitors falls within the age bracket of 20-35, indicating a common appeal to the young adult demographic. Both malls witness a substantial portion of frequent visitors, frequent visitation implies a strong connection between visitors and the mall's offerings. In terms of motivations, both malls see a considerable percentage visiting for entertainment, followed closely by movie-related visits. Shopping is also a notable factor, though Labim Mall has a higher percentage of social visitors compared to Civil Mall. Initial attractions upon entering are intriguingly similar; both malls observe visitors being drawn to the open space with the food court. The appeal of vertical circulation elements, such as escalators and elevators, is also comparable. The perception of connectivity within the malls is strikingly parallel, with the majority in both malls finding the spaces moderately connected. Preferred activities echo a similar sentiment, with the highest percentage in both malls enjoying window shopping and entertainment. A comparable proportion is inclined towards food courts, while a significant minority finds pleasure in observing activities from open floors. Both malls attribute

importance to factors such as attractive storefront displays, ample lighting, and seating areas. Notably, both malls have a similar proportion of visitors who find signage and wayfinding to be moderately effective, with a minority noticing or finding it very effective or ineffective. The proportion of visitors experiencing discomfort within specific spaces is almost identical in both malls, attributed to poor visual connection and inadequate lighting. The preferences for activities within the malls are aligned, with similar percentages opting for eating while walking, engaging in shopping or business transactions, and capturing moments through photography or videography.

6. Recommendation

Based on the conclusions drawn from the comparison of Labim Mall and Civil Mall, several recommendations can guide the design of new commercial establishments. Firstly, the design should take into consideration the young adult demographic (ages 20-35), a group that is attracted to both malls. Spaces that cater to their interests, including entertainment zones and a variety of dining choices prioritizing open and social areas is recommended to be developed. Develop designs that integrate spacious and well-lit communal areas, fostering a welcoming environment for visitors to unwind, socialize, and savor the ambiance as complexes' role as leisure and entertainment hubs are emerging. Enhance the visitor experience by investing in improved signage and wayfinding systems, incorporating clear and intuitive navigation aids.

Secondly, open spaces, adequate natural lighting and signages should be standardized and recommended by the guidelines so that architects and developers can refer to these guidelines to ensure that the design elements adhere to the established principles, enhancing the overall attractiveness and functionality of the space. In the guidelines, the process of collecting and analyzing visitor feedback should be outlined, and suggest key performance indicators (KPIs) to track and measure success. By establishing a systematic approach to assessment, the guidelines support a culture of continuous improvement and ensure that the commercial establishment remains responsive to visitor needs and preferences.

Lastly, empirical studies specifically focused on circulation spaces in commercial complexes in Nepal are scarce, indicating a need for more primary data and evidence gathering regarding the design, functionality, and user experiences of these spaces across various types of commercial complexes throughout the country. Further research should delve into users' perceptions of circulation spaces, their preferences, wayfinding strategies, and satisfaction levels.

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