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Behavioural Dynamics in Transit Hubs: Impact of High-Quality Interior Design in Railway Stations

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Abstract

The research paper has been conducted to study the behavioral dynamics of rail transit hubs, with particular emphasis placed on the role high-quality, interior spaces in influencing passenger experiences, behaviors, and well-being while at a railway station. A railway station can be viewed as a space between origins and destinations for passengers, but it also serves as a social hub that influences how passengers' moods, perceptions, and behavioral dynamics develop.The research paper is an exhaustive study of various interior spaces of railway stations, such as spatial layout, lighting, materiality, signage, and other facilities, in order to understand the role of high-quality interior spaces in shaping the overall experience of passengers. The research paper is an analysis of exemplary railway stations in different parts of the world that offer high-quality interior spaces in order to understand the various strategies that designers adopt in order to develop spaces that facilitate positive behavioral dynamics among passengers. The research paper concludes that high-quality interior spaces do not just facilitate the efficiency of railway stations but also play an important role in shaping the social behavior, peacefulness, and identity of railway stations.

Keywords: Behavioral dynamics, Transit hubs, Interior design, Railway stations

1. Introduction

One of the most crucial components for the movement of passengers within the framework of transportation infrastructure is the railway station. Millions of passengers are moved through the railway stations on a daily basis. However, the railway station is not only crucial for the movement of passengers but is also crucial for influencing the overall behavior of passengers within the framework of transportation infrastructure. The quality of interior design for the railway stations is all about designing the spaces that not only play a crucial role for the movement of passengers but are also crucial for influencing the overall psychological and emotional states of passengers. The overall interior design for the railway stations plays a crucial role for influencing the overall behavior of passengers within the railway stations. The overall interior design for the railway stations, including interior materials such as natural stone, glass, stainless steel, wood, and acoustic materials, plays a crucial role for influencing the overall acoustic, durability, and ambiance characteristics for the railway stations. Thus, the railway stations play a crucial role for influencing the overall behavior of passengers. As such,
the design of railway stations plays a vital role in influencing user behaviour, safety, comfort, and overall satisfaction. The study seeks to investigate the impact of quality interior design on the behavior

of passengers within railway stations, including the role played by individual interior design elements in enhancing or limiting the experience of the passengers. The study seeks to understand the relationship between interior design elements and other critical passenger behaviors, including movement, stress, and satisfaction levels. Through a comparative study of Sir M. Visvesvaraya Railway Station in Bangalore and Kranthi Veera Sangolli Rayanna Railway Station, this study seeks to provide insight into the best practices in the design of railway stations to enhance positive passenger behavior and interactions.

In addition to the above, the study also involved a literature review to obtain information from past studies and provide a theoretical background for the relationship between interior design elements and passenger behavior. Furthermore, the study utilizes a questionnaire as a major tool for obtaining information and understanding the responses of passengers to individual interior design elements, including materials.

Through the study of case studies of railway stations with varying standards of design, this study hopes to establish some of the best practices that can be followed in the creation of transit spaces that facilitate positive interactions between users.

Findings will give architects, urban planners & transportation councils good recommendations to improve designs of train stations so that they not only meet functional requirements but also offer passengers positive, rewarding experiences that are less stressful while travelling.

The study underscores the importance of selecting appropriate materials that are not only durable and aesthetically pleasing but also capable of enhancing the overall user experience through comfort, safety, and ease of maintenance. This study hopes to provide other relevant authorities on ways to improve the designs of railway stations, not only to meet functional requirements but also to create enriching and stress-free travel experiences for users. This study also highlights the need to choose materials that are not only functional but can also enhance the user experience.

2. LITERATURE STUDY

The author proposes that the internal experience of architecture can be seen as a useful perspective to examine the emotional and sensory aspects of architecture. The author's focus on the relationship between the body and space and the importance of materiality in understanding this relationship can be seen as a phenomenological approach to understanding architecture.{1}

Materiality is one of the fundamental aspects of interior architecture. Materiality can have a significant impact on the sensory experience of space. For instance, the tactile nature of natural materials can produce a sense of warmth and authenticity, while synthetic materials can produce a sense of sterility and futurism.{1}

The article is about understanding how human behavior and design have evolved together over time. In the past, some people saw the study of human behavior and its impact on design principles as restrictive and controlling. However, the authors propose that this is not necessarily true. The focus has shifted to using the studies of human behavior to understand how space can be designed to meet the social and psychological needs of people.{2}

The article highlights the need to consider the user's point of view in the planning of the urban environment. People have an inbuilt sense of personal space, and the planning of public_spaces should respect this. People's perception of the environment plays a critical role in the way they interact with the

environment. This perception should be well understood in the planning of public spaces that are safe, comfortable, and pleasant.{2}

The author asserts that the psychological dimensions can explain the aesthetic perception of architectural scenes. This means that the way people perceive the aesthetic appeal of the interior of a building can be reduced to a few underlying factors.{3}The dimensions are responsive to the design factors. The way the building is designed, the height of the ceiling, the use of straight or curved lines, and the use of enclosed or open spaces are critical in the way people respond to the building on a psychological level.The dimensions have specific underlying neural activity. The parts of the brain that are activated when people look at the architectural interior are related to the specific dimensions.{3}

The physical environment has the power to impact the psychology of an individual. Research has proved that the physical environment has the power to reduce stress, improve moods, and improve cognitive functions. Similarly, the interior design of the space, for instance, the office or the home, has the power to impact the level of productivity, creativity, and satisfaction. {4}

The built environment has the power to impact the psychology of an individual. Research has proved that the design of the space has the power to impact the mood, behavior, and cognitive functions of an individual. For instance, the design of the space has the power to reduce stress, improve concentration, and improve creativity. {5}

Color psychology has the power to impact the design of the space, particularly the design of the building by an architect. The color has the power to impact the mood of the individual, as the color has the power to create the mood of the individual. For instance, the color blue has the power to create the mood of calmness and serenity, whereas the color red has the power to create the mood of excitement and energy. {5}

The size of spaces, and the placement of windows and doors can all influence how people feel and behave. For instance, open-plan offices

The Importance of Space and Place

The spatial layout of a building may also influence human behavior. The layout of rooms, spaces, and the position of windows and doors may all influence human behavior and emotions. For example, open-plan offices may promote collaboration and creativity, while enclosed offices may promote privacy and focus {5}.

Spatial Organization: The layout and configuration of spaces may influence behaviour and emotions. For example, open-plan offices may promote collaboration, while enclosed offices may promote privacy and focus{6}.

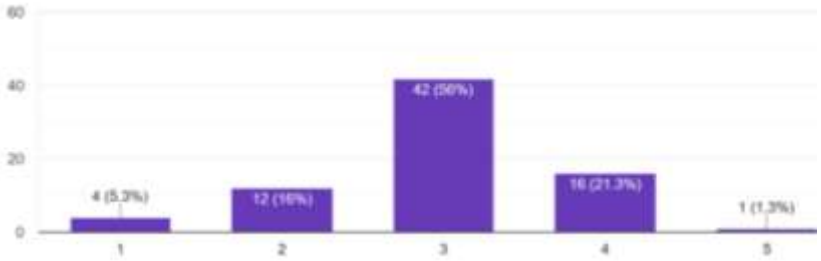
Materiality and Texture: The selection of materials and textures can provide a range of different experiences for the human senses. Materials like wood and stone can provide a sense of warmth and comfort.{6}Colour Psychology: Colours can create different emotions in the human mind. The psychology of colours can help the designer design a space that can produce a specific kind of mood or behavior.{6}Lighting Design: Lighting can play a crucial role in the well-being of humans, especially natural light, which can improve the mood of a person.{6}

Author says emphasizes visual problem-solving as a core component of design pedagogy, and Laseau (1980), who introduces diagramming as a bridge between abstract thought and spatial organization.{7}

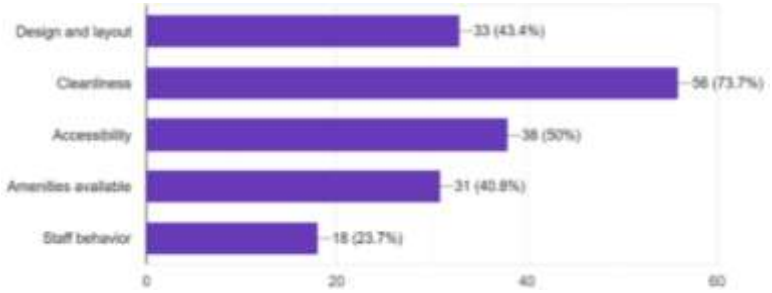
Architectural space planning is a complex process that includes planning spaces within a building to optimize functionality, aesthetics, and user experience. Conventional architectural space planning is

often time-consuming and tends to yield suboptimal solutions. This has resulted in research on applying computational techniques, especially evolutionary computing, to optimize the process.[8}

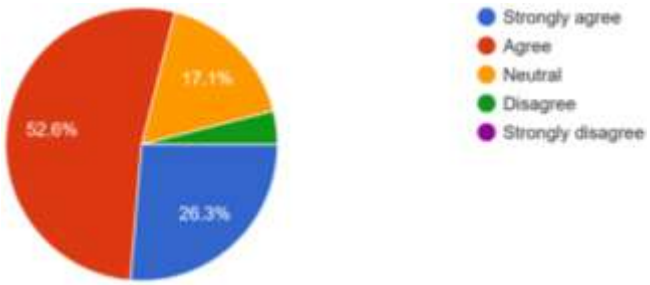
The Impact of Form on Emotion: Research has indicated that the form and geometry of architectural space can impact human emotions and behavior. Curved shapes have been shown to evoke positive feelings whereas angular forms can lead to feelings of tension and anxiety. Incidents have shown that the built environment can impinge on an individual's cognitive/emotional responses, i.e., how someone feels emotionally or cognitively due to environmental factors, since they all relate to how one perceives something based on how it feels or looks . Similarly, an individual's experience of sound, nature with/in/outside of the built environment, and or stressful situations may have direct and or indirect emotional and physiological responses, regardless of the experience. For **Example,** "A stressful environment experience because of sound alone may negatively affect a person's psychology ... resulting in the poor rates of recovery and or the low expectancy of life when in requiring care "All of this underscores the importance of designing built environments to optimize individuals' cognitive/emotional wellbeing For this Author's Support of this Statement: "Light and space are two examples of the EA's ideas/principles and their embodying CR and modernist ideas. Thus, lighting/space create emotional and psychic connections for the person using the space".



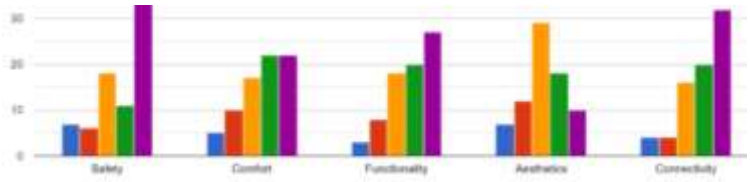
The majority of the respondents rate their experience at the railway stations as average, while relatively fewer respondents rate the experience as positive or negative, indicating a scope for improvement in the experience itself.



The experience of the users at the railway stations is largely influenced by **cleanliness**, followed by **accessibility and design/layout** of the railway stations. The role of the staff, though relatively less influential, should not be ignored as it also impacts the overall experience of the **users at the railway**

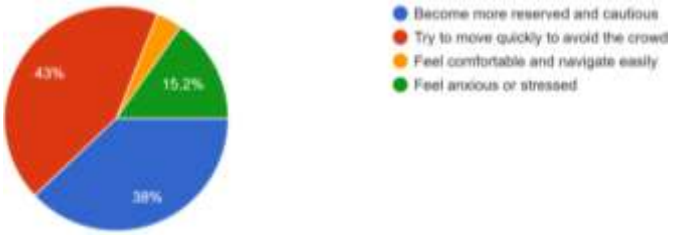


A majority of 78.9% (agreed and strongly agreed) share the view that "the design of the railway station has an influence on my mental state." This shows that design has a positive influence on users' experiences.



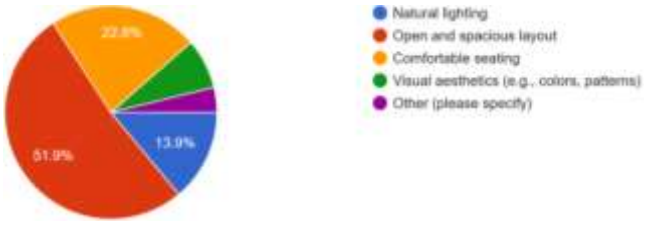
High Priority Elements: Safety, Connectivity, and Functionality are considered to be of high priority for a railway station.
Moderate Priority Elements: Comfort is considered to be of moderate priority and is of secondary importance compared to functionality and safety.
Low Priority Element: Aesthetics is considered to be of low priority, which reflects that functionality is given priority over aesthetics.

Thus, 89.7% of respondents agree that public space design affects their behavior and comfort to different extents. This further emphasizes the significance of architecture and space design in improving user experiences.

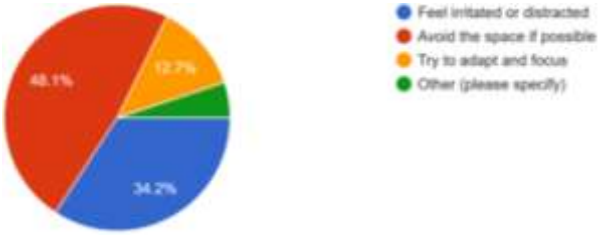


The substantial impact of space design on user experiences, as emphasized by more than half of the respondents, is in line with various theories that support the idea that space design can promote positive social behaviors, comfort, and usability.
The importance of color schemes and lighting in a space is also substantial, and they greatly influence user emotional responses. This further emphasizes that these aspects are essential components of space design and can greatly contribute to improving user experiences by designing a space that suits the user's emotional responses.
Thus, designers should focus on improving user experiences through thoughtful consideration of colors and lighting to evoke different emotional responses, including brightness and color psychology.
A general sense of discomfort or need for strategic navigation in crowded spaces This demonstrates why we need to consider how public spaces must be designed for effective crowd management, to minimize congestion, and to create as much comfort for the user as possible through the use of appropriate elements like signage (clear, direct, easy to read) along well-defined pathways (marked, not cluttered)

and designated quiet areas. Some users experience anxiety or distress; they may require a designated quiet zone or improved access to improved access options.



Designing a public space that encourages users to prioritize spaciousness, natural lighting and comfortable seating is very important. This can assist architects and interior designers in creating an atmosphere that is welcoming and comfortable for the user.



They are more likely to feel irritated or distracted and prefer to avoid such spaces altogether. This underscores the importance of well-designed environments for creating positive and productive experiences.

3. INFERENCE

The results obtained from the survey have been quite useful in understanding the parameters that have an impact on the passengers' experience in the railway stations by using a structured approach in conducting the questionnaire. This has helped in understanding the impact of parameters like cleanliness, accessibility, comfort, and aesthetics in the passengers' experience by using the data-based approach to collect information from 80 passengers to ensure that varied opinions are obtained regarding the usage of the public space. This has helped in gaining a comprehensive understanding of the impact of parameters like cleanliness, accessibility, comfort, and aesthetics in the passengers' experience.

The questionnaire approach has helped in gaining more information from the passengers, and this has ensured that the results are not based on theories but actual experiences. This approach has helped in validating the importance of the parameters by using the data-based approach. This has also helped in understanding the exact parameters that need to be improved. The feedback obtained is also important and has added up to 80, representing the diversity of the demographic characteristics of the passengers using the public space. This study has emphasized the importance of developing stations for the convenience of passengers.

Cleanliness is a very important characteristic for all respondents. From an architectural perspective, this means that clean and easy to maintain spaces (whether residential or commercial) create benefits for the occupants. One method to achieve this goal is to use materials which provide a high level of ease of cleaning; seamless flooring and surfaces that do not stain easily are two examples. Another aspect that promotes cleanliness and discourages littering is the inclusion of waste management facilities. Lastly, it is important for patrons to utilize well-maintained and easily accessible toilets, especially when those toilets include natural ventilation and light.

The respondents also stressed the importance of accessibility within stations looking at station accessibility for different types of users. This has obvious architectural implications; for example, architectural plans for stations must include design elements such as ramps, elevators/lifts, tactile paving and Universal Design toilets. The importance of clear/concise wayfinding systems (e.g., appropriate signage, maps) is paramount. From an architectural perspective, an organized and open layout is essential to avoid confusion and allow passengers to move through a station in a smooth and orderly manner.

Comfort is another factor affecting the happiness of passengers. Therefore architecturally there should be seating available for all passengers who are waiting for their flight, shading available for those who are waiting outside and climate control will be required to keep the environment comfortable. Furthermore, lighting is a second factor that has been identified that improves safety and comfort by providing natural and/or artificial light sources can extend the comfort level of the passenger. Providing rest or retail spaces for passengers will further provide added value.

Although staff behavior is mainly related to service characteristics, it also has implications for architecture and the built environment in relation to the stations. This indicates that stations need to include staff kiosks/desks that can be identified/easily accessed by the travelling public. The design of these areas should include an emphasis on the encouragement of interaction between the staff and passengers to create effective service to passengers.

Another issue that came out in many of the responses to the questionnaire was aesthetics of design. This implies that there needs to be an emphasis on stations being aesthetically pleasing and interesting for the travelling public. From an architectural perspective, this is achieved through effectively combining natural elements such as plants and water features into the design of the building as well as through the use of physical design elements that convey warmth and identity. There were several comments made by passengers regarding cultural and artistic features associated with stations; therefore, these features will assist in creating a sense of individuality for the station.

4. CONCLUSION

The design of railway stations is a multifaceted issue, as they combine several distinct elements, including functionality and comfort, and the ability to serve as landmarks in urban settings. Survey results indicate that through the design of stations, designers are able to accommodate the varied needs of passengers and increase the overall image of the station as an architectural landmark.

Therefore, it is clear that it is not just about keeping railway stations clean but is also associated with designing them. For instance, it is recommended that strong non-porous materials such as polished concrete flooring or vitrified tiles be used because they can be easily cleaned and do not allow stains to form. In addition to this, the smoothness of surfaces such as the walls and counters is an important factor in ensuring cleanliness because it becomes much easier to clean these surfaces. The incorporation of hidden waste disposal, bins, and cleaning facilities is an important factor in integrating cleanliness without affecting aesthetic appeal.

There are many aspects to consider in relation to the use and value of the station as a landmark within an urban area. Results from surveys have shown that designers of railway stations can assist in meeting passenger needs and improve passenger perception of the station as an architectural landmark through appropriate design.

For instance, it is important that a railway station be clean but also looks good. For that reason, a strong and durable, and non-porous type of material for flooring surfaces (such as polished concrete and vitrified tiles) is preferred because it is easy to clean and there is no chance for stains to be left on the surfaces. Second, having flat surfaces on walls and counters is important to assist in keeping them clean. Third, having waste and cleaning items concealed is important to provide the potential for keeping the station clean and aesthetically pleasing.

There are many aspects to consider in relation to the use and value of the station as a landmark within an urban area. Results from surveys have shown that designers of railway The aesthetic identity of the railway station is also very important for the overall perception of the space as a community space. The architectural identity of the railway station can celebrate its location by embracing the local culture and heritage within the design of the building. The use of cultural elements within the building can turn the railway station into a landmark for the community. The façade and interior of the building, which incorporate the use of cultural elements, can turn the railway station into an experience for the passengers. The use of cultural elements within the building can turn the railway station into an experience for the passengers.

Another important factor for the design of the railway station is the use of functional zones. While designing the railway station, the use of functional zones must be taken into account for the efficient design of the space. The areas such as the platforms must be differentiated from the areas such as the waiting rooms, which are not used as frequently. The flexibility of the design will help in the construction of the building, which will incorporate the use of modular construction. The construction will help in the expansion of testation's can assist in meeting passenger needs and improve passenger perception of the station as an architectural landmark through appropriate design.

Literature Study

Previous studies highlight the relationship between architecture and human behaviour. Materiality, lighting, and spatial planning significantly impact perception, comfort, and emotional response. Research also emphasizes the importance of user-centered design in public spaces to enhance usability and well-being.

Primary Study

Survey findings indicate that cleanliness, accessibility, and spatial layout are key factors influencing passenger experience. A majority of respondents agree that design impacts their mental state, reinforcing the importance of thoughtful interior design in transit hubs.

Inference

The study reveals that well-designed railway stations improve user satisfaction by addressing cleanliness, accessibility, and comfort. Architectural interventions such as clear wayfinding, appropriate material selection, and adequate lighting can significantly enhance user experience.

Conclusion

Railway station design must balance functionality, comfort, and aesthetics. By integrating user-centered design principles, architects can create transit spaces that are efficient, comfortable, and emotionally engaging.

REFERENCES

1. The Interior Experience of Architecture: An Emotional Connection between Space and the Body" by Kaushey Lee
2. Human Social Behaviour in Public Urban Spaces Towards Higher Quality Cities" by -Israa Hanafi Mahmoud
3. Psychological and neural responses to architectural interiors" by -Oshin Vartanian b, Yoed N. Kenett f g, Marcos Nadal c, Franziska Hartung f, Gregor Hayn-Leichsenring f, Gorka Navarrete d, José L. González-Mora e, Anjan Chatterjee
4. The Impact of Built Environment on Human Behaviours" by-Amira Mahmoud
5. The Psychological Impact of Architectural Design" by-Natalie Ricci,
6. by-Heba-Talla Hamdy Mahmoud
7. Interior Architectural Elements that Affect Human Psychology and Behaviour"
8. A New Approach to the Space Design Process in the Interior Architecture Basic Design Studio" by-H.özlem Yurtgün
9. Architectural space planning using evolutionary computing approaches" by-Kamlesh Dutta & Siddhant Sarthak
10. Walking through Architectural Spaces: The Impact of Interior Forms on Human Brain Dynamics" by-Javad Hatami Abbas Yazdanfar Klaus Gramann
11. The Cognitive-Emotional Design and Study of Architectural Space: A Scoping Review of Neuroarchitecture and Its Precursor Approaches" by- Juan Luis Higuera-Trujillo,
12. Light and Emotional Architecture: An Embodied Experience" Published under licence by IOP Publishing Ltd
13. Culture and social behaviour" by-Joseph Henrich