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Article

A Study of Changes in User Satisfaction in Metro Stations in Dubai

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Abstract: Over the past twenty years, rapid urbanization in Dubai has fundamentally changed land use. This has necessitated significant infrastructure development to meet the needs of the growing urban population. Therefore, this study examines changes in public satisfaction with the Dubai Metro between 2010 and 2018. Surveys were conducted at eight strategically selected metro stations, with 400 respondents at each time point, to evaluate six core factors, which are usage, cost, facilities, challenges, contextual integration, and walkability. Statistical analysis, including Chi-square tests, revealed significant shifts across all factors. Daily metro usage increased by over 10%, indicating growing reliance on the system, while perceptions of affordability declined, with twice as many users finding fares expensive in 2018. Satisfaction with station facilities and contextual integration improved substantially, reflecting successful investments in infrastructure and urban planning. However, accessibility and external walkability emerged as growing concerns, underscoring the need for enhanced pedestrian connectivity and inclusive design. The findings offer actionable insights for transport policy and urban development for Dubai and underscore the importance of continuous feedback in shaping public infrastructure.

Keywords: Dubai Metro; user satisfaction; public transportation; accessibility; walkability; urban infrastructure; transit policy; repeated cross-sectional analysis

1. Introduction

Urban growth in Dubai city has increased rapidly in the past two decades. In 2020, this urban growth was concentrated within the waterfront area and along highways, specifically Sheikh Zaid Road. This major road, with Emirate Road, connects newly developed areas mainly scattered along these two primary spines. Urban development has significantly increased the built-up area in Dubai with the government providing funding to attract further investment. Economic growth accelerated, and more development projects have been planned to support this growth. The total built-up area increased from 54 km^2 in 1975 to 977 km^2 in 2015, as Dubai increased (1700 % in only 38 years), which has made Dubai one of the fastest-growing cities in the world (Elessawy & Boom, 2017). This rapid urban development of the city transformed Dubai from a small business, financial, and entertainment hub into an international center. More capital was invested in low-rise community developments and many high-rise buildings during the urbanization process. Today Dubai's skyscrapers rise from clusters, artificial islands rise from the sea, and villas in the new suburbs rise from the desert.

Dubai's population at 1.875 million in 2010 has almost doubled to an estimated 3.095 million in 2025 (Macrotrends LLC., 2025). The upward movement of population growth is due to abundant job opportunities, investor-friendly environment without income tax, desirable lifestyle, high quality infrastructure, and global events that drew people from across the world to Dubai for residency (Aora Tech, 2025). This growth has certainly impacted urban development, and more services and

infrastructure are now in place to meet public demand. In response to the unprecedented growth, the Dubai 2040 master plan (Emirates News Agency - WAM, 2021; United Arab Emirates Government, 2023), proposes to facilitate sustainable and flexible means of mobility through the use of mass transit among many other aims. This master plan will lead towards the expansion of the existing Dubai Metro network with an additional line called the Blue Line that will be completed by 2029 (Tesorero, 2023).

Nevertheless, the Dubai metro has become a backbone of people's transport and has ridden the evolution in public attitude towards mass transport. People began to grasp the benefits of using public transport for peace of mind, physical relief, higher safety, lower car expense offered by integrated and smooth transit solutions in the Emirate. Using technology to optimize the efficiency of public transport systems, the city has also introduced policies to limit people's semi-total reliance on private vehicles by offering other transit means.

Understanding the importance of the Dubai Metro to the physical growth of the city, this study aims to investigate the changes in Dubai Metro user satisfaction and public opinion over two periods, in a repeated cross-sectional analysis of several sustainable urban design factors.

2. Literature Review

2.1. Overview of User Satisfaction in Public Transportation

User satisfaction with public transportation is a multidimensional construct shaped by factors such as service reliability, cost, accessibility, facilities, and spatial integration. Research ~~has~~ demonstrates that satisfaction influences transit usage frequency, mode choice, and perceptions of urban livability. In cities undergoing rapid development, these factors often shift as public expectations and infrastructure evolve. Previous studies used the SERVQUAL model, which was introduced in 1998, and was adapted for analyzing the service quality of rail networks. Past research utilized this method as they focused on the quality of services provided by rail/metro networks in Turkey, Indonesia and Qatar (Cavana et al., 2007; Celik et al., 2014; Dianawati et al., 2019; Flores et al., 2025). These studies are undoubtedly valuable, especially for rail and metro network operators and authorities to audit and improve their services. Similar methods were derived from SERVQUAL such as Impact Score Technique (IST) (Akyildiz Alçura et al., 2021) or RAILQUAL (Devi Prasad & Raja Shekhar, 2010) to reduce some argued weaknesses or localization issues in the SERVQUAL model design. However, these models did not address sustainable urban design issues associated with rail or metro stations in relation to the surrounding urban context.

Further, there are many past studies that evaluated the first and last mile of rail or metro systems. Studies by (Delle Donne et al., 2025; Watts et al., 2025; Widiastuti & Irawan, 2024), discussed at length all first and last mile issues using qualitative walkability audits and questionnaires. Ramli et al. (2022) even developed their own methodology to conduct their study, but the reality is, these FMLM studies also did not cover other relevant sustainable urban design factors. Further, these studies focused on single stations or time-specific snapshots; neglect changes over time in user experience and perceptions; and underestimate the impact of evolving urban development on station accessibility and functionality.

In response to this gap, this study did not use SERVQUAL model and FMLM factors as it focusses on several distinct sustainable urban design factors affecting the passengers and their Dubai Metro usage behavior rather than the quality of service and rail/metro connections with other public transportation systems. Therefore, this study introduces factors such as usage, cost, facility, problems, contextual integration, and walkability as detailed in Table 1. These factors are suitable in relation to the Dubai Metro, which is still undergoing further expansion, station placements, passenger demography, station designs, and provided facilities. This study offers insights into how urban development and spatial integration influence public perception of Dubai Metro infrastructure over time.

2.2. Key Determinants of Satisfaction: A Thematic Review

This study is grounded in six recurring themes from the literature, which also serve as the analytical framework for evaluating Dubai Metro user satisfaction.

3. Methodology

3.1. Cross-Sectional Survey

This study conducted two surveys in 2010 and 2018 for a cross-sectional analysis of several sustainable urban design factors that changes Dubai Metro's commuter perceptions and satisfaction. The first survey was conducted several months after Dubai Metro opened in 2009 and eight years later, when the population growth started to reduce from 2018 until today (Macrotrends LLC., 2025). A strict longitudinal study was not possible as respondents in 2010 were randomly selected at eight stations with

the highest ridership. Longitudinal studies require responses from the same individuals over time. Instead, this study compares group-level trends across two time points.

Based on the factors extracted from literature as shown in Table 1, the researchers developed a set of questionnaires containing nine questions which are grouped into six factors as shown in Table 2 to solicit Dubai Metro's commuter satisfaction levels and perception. There are several response types including frequency, multiple choice, 3-point and 5-point Likert scale perception responses to answer the questions. This questionnaire was used in 2010 and once again in 2018. The researchers obtained Ajman University Ethics Committee approval before conducting the surveys. No demographic information was collected not just to ensure a quick survey per respondent as they were travelling, but also to ensure their sensitivities were not compromised.

Table 1. Selected factors from past research concerning public satisfaction in mass transportation.

Factors	Selected Studies	Key findings and insights
Usage	(Echaniz et al., 2019; Gerber et al., 2020)	Regular transit use is associated with purpose-driven travel, particularly commuting. Increased satisfaction correlates with reliability and reduced travel time.
Cost	(Eboli et al., 2016; Mayo & Taboada, 2020)	Perceived affordability plays a key role in user retention. Changes in fare structures can influence ridership, especially in cities with rapid demographic shifts.
Facilities	(Naveen & Gurtoo, 2020; Saw et al., 2020)	Amenities such as retail, entertainment, and cleanliness contribute significantly to user comfort and overall station experience.
Challenges/ Problems	(Shaaban & Khalil, 2013; Sinha et al., 2020)	Recurring issues include limited parking availability, inconvenient station location, and poor intermodal integration.
Contextual Integration	(Alawadi, 2017; E. Mushtaha et al., 2018)	The alignment of metro station design with surrounding land use and development is vital in enhancing public satisfaction and station accessibility.
Walkability	(E. Mushtaha et al., 2018; Sinha et al., 2020)	Pedestrian accessibility both to and within stations strongly affects user experience, particularly in environments with extreme climates.

Table 2. Questionnaire design according to factors. Source: Authors' own work.

No.	Factors	Questions Asked	Response Types
1	**Usage**	Metro usage frequency.	Frequency
		Reason for using the Dubai Metro.	Multiple choice
2	**Cost**	Cost of using the Dubai Metro.	3-point Likert scale perception
3	**Facility**	The entertainment and shopping facilities in the Metro station.	5-point Likert scale perception
4	**Problem/Challenges**	Main problem in using the Dubai Metro.	Multiple choice
		Preference of using the Dubai Metro.	
		Main problem in using the Dubai Metro when driving to get to the station.	
5	**Contextual Integration**	Perceived suitability of Dubai Metro station design in relation to surrounding urban features, and land uses.	5-point Likert scale perception
		Perceived suitability of Dubai Metro station design in relation to surrounding amenities.	5-point Likert scale perception
6	**Walkability**	The rate of the walking distance inside the station to get to the Metro	Multiple choice

3.2. Sampling

The participants were randomly selected after alighting from the trains at the eight selected stations. A group of researchers was assigned to each station over several Saturday afternoons in 2010 and 2018, between 4 to 6pm to gather up to 50 respondents to achieve a 400 randomly selected respondent target. This sample size target is larger than 377 needed for 563,500 Dubai Metro passengers in 2018 (35% of 1.61 million daily average commuters on Dubai's public transportation system) as reported by Gulf News (2019). The daily average in 2010 is 104,353 based on the Government of Dubai Media Office (Mohammed, 2023) press release, and the required sample size is 383. The researchers used an online sampling calculation tool called Raosoft to determine the sample size with a 4.85% (2018) or 4.89% (2010) margin of error, 95% confidence rate, and 50% response distribution (Raosoft Inc., 2004). This was to ensure that an adequate number of commuters were sampled to represent the Dubai Metro passengers.

The number of public users for Dubai Metro is shown in Table 3, which clarifies the increase in public users and the increase in each of the selected stations in Dubai Metro between 2010 and 2018. The stations with the highest number of public users are Burjuman, Union Station, and Deira City Centre. The increase of the users changed from one station to another due to location, accessibility, and availability of car parking close to the station. Although the increase is justified for many reasons, the graphs also indicate that Dubai Metro is a popular choice for public users. The percentage of public users of Dubai Metro varies among the selected stations, as shown in Table 3. There is a high increase in all stations from 2010–2018. The percentage changes are the highest at the Trade Centre, GGICO, and Dubai Mall stations with an increased percentage of 72%, 64%, 58%, respectively. On the other hand, the lowest percentage is in Union Square station, Burjuman and Mall of the Emirates stations with an increase in the percentage of 24%, 28%, 32% respectively.

Table 3. Dubai Metro passengers' numbers in 2010 and 2018. Source: (Dubai Statistics Center, 2012, 2018).

No.	Station	2010	2018	Changes percentage (%)
1	Mall of the Emirates	3,792,672	7,273,478	191.78%
2	Burj Khalifa/Dubai Mall	2,092,711	7,720,055	368.90%
3	World Trade Center	592,211	3,650,064	616.35%
4	Burjuman	4,703,925	8,226,283	174.88%
5	Union Square	4,866,588	7,822,170	160.73%
6	Deira City Centre	3,369,915	7,565,091	224.49%
7	GGICO	541,398	2,488,256	459.60%
8	Rashidiya	2,291,794	5,623,756	245.39%

Currently, the surveyed stations are several of the most heavily used stations on the network. According to the latest Dubai Metro yearly ridership data for 2024 (Mair, 2025) for 5 out of 8 surveyed stations are Burjuman with 16.2 million, Union Square with 12.9 million, Mall of the Emirates with 11.2 million, and Burj Khalifa/Dubai Mall with 10.6 million riders.

3.3. Internal Consistency of Survey Instrument

To assess the internal consistency of the survey instrument, Cronbach's Alpha was calculated for the six core factors used to evaluate user satisfaction with the Dubai Metro: Usage, Cost, Facilities, Challenges, Contextual Integration, and Walkability. Each factor was measured on a 5-point Likert scale. The resulting Cronbach's Alpha values were 0.0323 for the 2010 dataset and 0.0490 for the 2018 dataset. These values indicate low internal consistency, which is expected and acceptable given the multidimensional nature of the instrument. Each item in the survey was designed to independently assess a distinct aspect of metro user satisfaction rather than to contribute to a single underlying construct. This structure aligns with prior studies on public transport evaluation, where satisfaction is typically treated as a composite of independent dimensions rather than a unidimensional scale.

3.4. Study Limitations

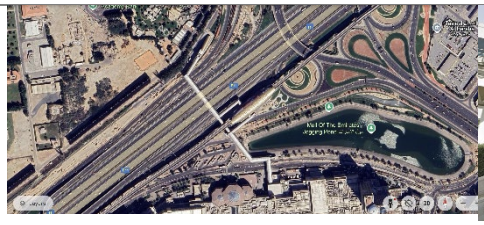
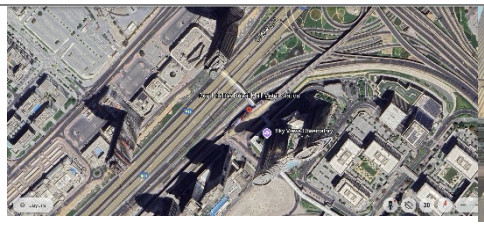
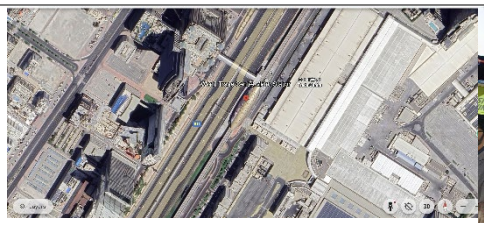
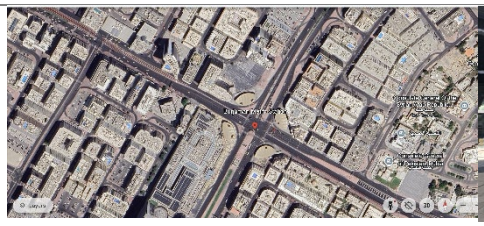
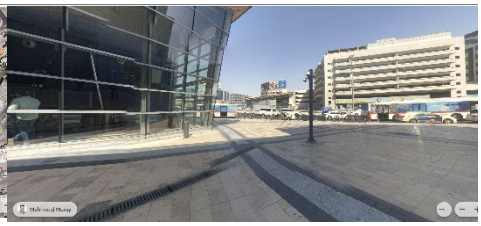
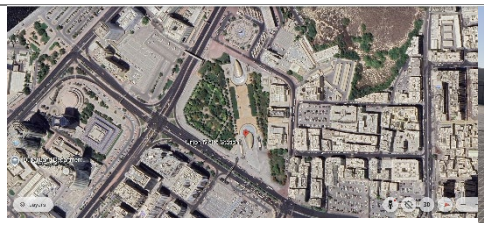
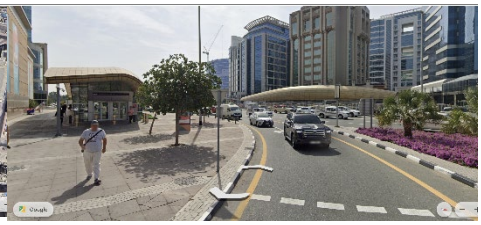
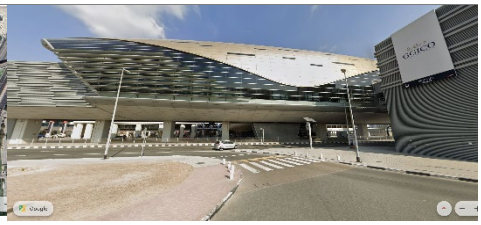
As mentioned previously, this study does not use the SERVQUAL method, thus excludes external factors that could affect the passengers' responses such as policy changes, fare adjustments, or their socio-economic situations. Further, the surveys were done at crowded stations that could have distracted the respondents. They could also have been in a hurry and these conditions could affect their responses.

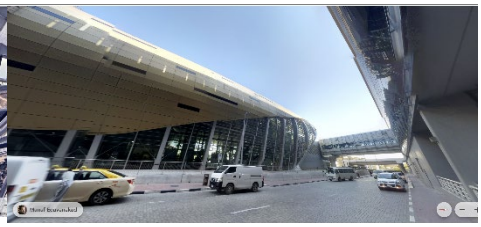
3.5. Survey Locations

Figure 1. Dubai Metro Lines and stations where commuters were surveyed. Source:(RTA.ae, 2025).

This study surveyed eight stations on the Red Line of the Dubai Metro. The selection criteria were based on the importance of these stations. Two of the selected stations: Burjuman and Union Square, have access to the main green and red metro lines. Three selected stations are located in major shopping centers: Diera City Center, Burj Khalifa/Dubai Mall, and Mall of the Emirates. The remaining three stations are located close to important sites; GGICO station is near Gulf General Investment Company in the Garhoud area, and Rashidiya station is located in Al Rashidiya, a residential community of eastern Dubai, where most nearby points of interest are schools and community centers. Rashidiya is one of the few Dubai Metro stations classed as a type 3 elevated station, and it is considered one of the busiest stations on the network. The final station studied is World Trade Centre Metro Station which serves a major event and exhibition center in Dubai city. These eight selected stations have different surroundings and communities to serve, but they have similarities in being busy and crowded by public users. The locations of these stations are shown in Figure 1. Table 4 below shows the selected stations and the surrounding areas.

Table 4. Images of selected stations and the surrounding areas. Source: (Google, n.d.).

Stations	**Station context**	**Area under the station**
Mall of the Emirates		
Burj Khalifa/Dubai Mall		
World Trade Center		
Burjuman		
Union Square		
Deira City Centre		
GGICO		

Stations	Station context	Area under the station
Rashidiya		

4. Results

The study evaluated six user satisfaction factors, which are usage, cost, facility, problems, contextual integration, and walkability across two independent cross-sectional surveys in 2010 and 2018. The results reveal statistically significant trends across all key variables. This study hypothesizes that there is a statistically significant difference in user satisfaction with Dubai Metro across the six evaluation factors between 2010 and 2018. Additionally, each factor has a sub-hypothesis that corresponds to the reported statistical test results.

4.1. Usage

4.1.1. Usage Patterns

Daily use of the metro increased from 132 commuters (33%) in 2010 to 174 (43.5%) in 2018, as shown in Table 5. This change reflects a statistically significant shift in usage frequency over time, with a Chi-Square of $\chi^2(5) = 22.29$, $p = 0.0005$. More users reported frequent use in 2018, suggesting greater public acceptance and reliance on the metro. This finding supports a sub-hypothesis that user frequency and purpose of Dubai Metro usage changed significantly between 2010 and 2018, as there was a significant increase in frequent users (daily, twice/week) and decrease in occasional users, reflecting greater system reliance over time.

Table 5. Dubai Metro usage frequency. Source: Authors own work.

	Year/Number of respondents		
Frequency	2010	2018	Change
Daily	132	174	+42
Twice a week	53	71	+18
Once a week	76	55	-21
Twice a month	58	42	-16
Once a month	69	41	-28
None	12	17	+5

4.1.2. Reason for Using the Dubai Metro

There is a statistically significant change in the primary reasons for using the metro from 2010 to 2018 ($\chi^2(4) = 25.61$, $p = 0.0000$). Commuting to work remains the most common reason and has increased, suggesting the metro's growing role in supporting daily routines. Refer to Table 6 below. The sharp decline in "shopping" as a reason may reflect either shifting consumer behavior (e.g., e-commerce or destination changes) or improved access to retail areas by other modes. The increase in "None" and "Take another transport" means broader modal integration or changes in travel purpose.

Table 6. Reason for using the Dubai Metro. Source: Authors own work.

	Year/Number of respondents		
Reason	2010	2018	Change
Go to work	149	171	+22
Go shopping	114	74	+40
Visit a place	93	80	-13
Take another transport	41	41	-14
None	3	20	+17

4.2. Cost

While the majority still found metro fares affordable, the proportion viewing it as "expensive" nearly doubled, from 44 responses (11%) in 2010 to 83 (20.8%) in 2018, as shown in Table 7. This difference was statistically significant ($\chi^2(2) = 14.58$, $p = 0.0007$), indicating increasing price sensitivity. This observation also supports a sub-hypothesis that perceptions of cost changed significantly between 2010 and 2018, as more users perceived the metro as expensive in 2018, indicating a shift in fare satisfaction, possibly due to inflation or changing expectations.

Table 7. Dubai Metro cost perception among commuters. Source: Authors own work.

	Year/Number of respondents		
Perception	2010	2018	Change
Expensive	44	83	+39
Affordable	202	187	-15
Cheap	154	130	-24

4.3. Facility

The percentage of respondents rated station facilities as "excellent" rose from 16.5% (66 responses) to 23.8% (95 responses), as shown in Table 8. The overall distribution of satisfaction ratings changed significantly with a Chi-Square of $\chi^2(4) = 9.99$, $p = 0.0406$, demonstrating an improvement in users' experiences over the eight-year period. This finding supports another sub-hypothesis that satisfaction with facilities improved significantly between 2010 and 2018, as there was a significant increase in "Excellent" and "Very Good" ratings, suggesting improved quality and availability of facilities within stations.

Table 8. Dubai Metro facility satisfaction among commuters. Source: Authors own work.

	Year/Number of respondents		
Rating	2010	2018	Change
Excellent	66	95	+29
Very Good	119	122	+3
Good	147	132	-15
Fair	51	43	-8
Poor	17	8	-9

4.4. Problems/Challenges

4.4.1. Metro Challenges

Reported problems shifted from parking availability in 2010 to accessibility in 2018. Concerns about parking availability dropped by 12% (48 responses), while accessibility issues rose by 10.5% (42 responses), as shown in Table 9. The difference was highly significant ($\chi^2(2) = 17.25$, $p = 0.0002$), indicating evolving commuter priorities. This observation supports a sub-hypothesis that the nature of user-reported challenges changed over time. There is a shift from parking availability concerns (reduced) to station accessibility (increased), reflecting urban growth and increased pedestrian reliance on the network. Further, Dubai Municipality has provided parking zones for metro users in many locations to encourage people to use the network thus, a slight increase in "parking location" being reported as a problem in 2018, despite a significant rise in ridership.

Table 9. Dubai Metro main problems according to surveyed commuters. Source: Authors own work.

	Year/Number of respondents		
Problem Type	2010	2018	Change
Accessibility	100	142	+42
Parking Location	159	165	+6
Parking Availability	141	93	-48

4.4.2. Preference for Using the Dubai Metro

Although there are visible shifts in user preferences, particularly a drop in "punctuality" and a rise in "safety," these changes are not statistically significant ($\chi^2(4) = 6.83$, $p = 0.1453$). Refer to Table 10 below. This suggests that overall user motivations for choosing the metro, especially related to convenience and

time, have remained stable. However, the increase in users highlighting safety indicates growing awareness or improved perceptions of transit safety.

Table 10. Dubai Metro user preferences. Source: Authors own work.

	Year/Number of respondents		
Preference	2010	2018	Change
Convenience	105	108	+3
Punctuality	152	125	-27
Safety	63	83	+20
Do not use car	70	68	-2
Other	10	16	+6

4.4.3. Main Problems When Driving to the Dubai Metro

There is a significant change in user-reported problems when driving to metro stations ($\chi^2(3) = 35.00$, $p = 0.0000$). Concerns about "station location" have dropped considerably, which may reflect improved wayfinding or newer stations placed in more accessible locations. Refer to Table 11 below. Meanwhile, "parking" remains a persistent issue, and the rise in "Not applicable" responses suggests that more users may be walking, cycling, or using other modes of public transport such as busses or taxis to reach stations. This observation is a positive shift for sustainable transport goals.

Table 11. Users' reported main problems when driving to the Dubai Metro. Source: Authors own work.

	Year/Number of respondents		
Driving-related problem	2010	2018	Change
Parking	126	141	+15
Driving distance	102	95	-7
Station location	137	81	-56
Not applicable	35	83	+48

4.4.4. Contextual Integration with Surrounding Areas

Perceptions of how well metro stations integrate with their surrounding areas have significantly improved over time. The proportion of respondents rating this factor as "Excellent" rose from 70 (17.5%) in 2010 to 123 (30.8%) in 2018, as shown in Table 12. Simultaneously, "Poor" ratings fell from 9.0% of the respondents to just 1.5%. The change is statistically significant ($\chi^2(4) = 42.37$, $p < 0.0001$), indicating improved planning and development around station nodes over the 8-year span. This significant finding strongly supports a sub-hypothesis that perceived integration of station design with surroundings improved over time. It is found that "Excellent" and "Very Good" ratings increased significantly, while "Poor" dropped sharply, indicating perceived improvement in station urban fit. This could also indicate the commuters' agreement to physical improvements surrounding the stations and new buildings that complement the stations' iconic architectural features.

Table 12. Dubai Metro stations' contextual integration perception by the commuters. Source: Authors own work.

	Year/Number of respondents		
Rating	2010	2018	Change
Excellent	70	123	+53
Very Good	117	133	+16
Good	142	106	-36
Fair	35	32	-3
Poor	36	6	-30

4.5. Walkability

4.5.1. Walkability to Metro Stations

Public satisfaction with walkability to metro stations also changed significantly ($\chi^2(4) = 32.54$, $p < 0.0001$). While "Good" ratings increased from 105 (26.3%) to 154 (38.5%), "Excellent" ratings declined from 120 (30.0%) to 70 (17.5%), and "Poor" ratings more than doubled, as shown in Table 13. These shifts suggest changing user expectations and point to the need for enhanced pedestrian infrastructure and comfort features around stations. This finding supports a sub-hypothesis that perceptions of

walkability to the stations changed significantly between 2010 and 2018. The commuters' ratings shifted from "Excellent" to "Good" and "Poor," suggesting increased scrutiny or unmet expectations as urban complexity increases.

Table 13. Dubai Metro walkability perception among commuters. Source: Authors own work.

	Year/Number of respondents		
Rating	2010	2018	Change
Excellent	120	70	-50
Very Good	117	105	-12
Good	105	154	+49
Fair	43	35	-8
Poor	15	36	+21

4.5.2. Internal Walkability Within Stations

Respondents' perceptions of walking distances inside metro stations improved significantly from 2010 to 2018 ($\chi^2(2) = 10.79$, $p = 0.0045$). In 2010, 147 (36.8%) of respondents reported long walking distances, which dropped to 27.0% in 2018. Simultaneously, those reporting short distances rose from 78 to 107, as shown in Table 14. These changes suggest that improvements in internal station design, such as clearer wayfinding and better spatial connectivity, have positively impacted user satisfaction. There is a notable decline in perceived long walking distances and increase in "Short" or "Average" ratings indicate improved station layouts or user adaptation to the existing station layouts. Thus, a sub-hypothesis that perceptions of walkability within metro stations changed significantly between 2010 and 2018, is supported.

Table 14. Internal walkability within stations perception. Source: Authors own work.

	Year/Number of respondents		
Walking Distance	2010	2018	Change
Long Walking Distance	147	108	-39
Average Walking Distance	175	185	+10
Short Walking Distance	78	107	+29

Overall, there is a statistically significant difference in user satisfaction with Dubai Metro across the six sustainable urban design factors between 2010 and 2018. All six dimensions showed statistically significant changes ($p < 0.05$), indicating that user satisfaction and perceptions evolved meaningfully between 2010 and 2018.

All six sub-hypotheses and the overarching hypothesis were supported by inferential statistics. The findings demonstrate that public satisfaction with Dubai Metro has evolved significantly from 2010 to 2018, driven by changes in urban form, user expectations, and infrastructure enhancements. The strongest improvements were observed in contextual integration and internal walkability, while cost perception and external walkability present emerging concerns.

5. Discussion

The statistical analyses revealed insights that could be used to improve the Dubai Metro network and its stations. For instance, the increase in daily metro usage from 33% in 2010 to 43.5% in 2018 indicates a growing dependence on the metro system for everyday mobility. This finding ~~situation~~ is similar to those on the Doha Metro by Flores et al. (2025). The significant change in usage frequency ($\chi^2 = 22.29$, $p < 0.001$) suggests that more residents view the metro as a reliable and convenient transportation mode, aligning with prior research linking service frequency and reliability to satisfaction. This trend is especially notable given Dubai's traditionally car-centric transportation culture.

While a majority of respondents in both years viewed the metro as affordable or cheap consistent with Rigolon et al. (2024), the proportion of users who considered it expensive nearly doubled in 2018. This change was statistically significant ($\chi^2 = 14.58$, $p = 0.0007$), potentially reflecting rising fares, increased travel distances, or changing socio-economic expectations. As Dubai grows and diversifies, this perception shift suggests the need for policy attention to maintain fare accessibility.

Besides this, user satisfaction with facilities such as entertainment and shopping within stations improved significantly over time ($\chi^2 = 9.99$, $p = 0.0406$). The rise in "Excellent" ratings from 16.5% to 23.8% points to the success of infrastructure enhancements and commercial integration. This aligns with global best practices in transit-oriented development, where value-added services enhance the

attractiveness of public transport (E. S. Mushtaha et al., 2019).

Additionally, there is a significant shift in reported challenges among the commuters between 2010 and 2018 ($\chi^2 = 17.25$, $p < 0.001$). Contrary to previous study by Saw et al. (2020), concern over parking space availability declined. Instead, accessibility to stations emerged as a growing issue. This suggests that as car-to-metro transfers become more manageable, attention should shift to improving pedestrian (Saif et al., 2019) and multimodal access, particularly in fast-growing or high-density areas.

The most significant improvement was observed in perceptions of contextual integration ($\chi^2 = 42.37$, $p < 0.0001$). The sharp increase in "Excellent" and "Very Good" ratings reflects the success of metro station designs in blending with surrounding land uses and urban developments. This finding reinforces the role of well-integrated infrastructure in shaping long-term public satisfaction and supports previous architectural studies on climate-sensitive and functionally adaptive station design in Dubai.

Perceptions of internal walkability (i.e., walking distances within stations) improved significantly ($\chi^2 = 10.79$, $p = 0.0045$), with fewer users perceiving long walking distances. However, perceptions of external walkability (i.e., walking to the station) declined in excellence and increased in "Poor" ratings ($\chi^2 = 32.54$, $p < 0.0001$). This mixed outcome highlights the challenge of meeting pedestrian comfort expectations, which was highlighted by E. Mushtaha et al. (2018) in a rapidly evolving urban environment and hot climate. Continued investment in shaded pathways, wayfinding, and urban street design is warranted.

6. Conclusions

This study highlights that the Dubai Metro is the backbone of public transportation in Dubai, showcasing trends in ~~of~~ public user satisfaction between 2010 and 2018. By analyzing six separate factors that were derived from literature, this study found that there is an increasing commuter reliance on Dubai Metro for various functional usages. Additionally, there is a growing concern about affordability despite rising satisfaction with the provided facilities and station experience. There is also a shift in reported challenges when using the Dubai Metro to station accessibility, indicating more people walk, cycle, or use other modes of transport to get to the stations rather than driving. As the urban areas surrounding the stations develop, more people agree that the stations are now contextually integrated into the urban fabric. However, perception of walkability towards the stations worsens and not meeting pedestrian comfort expectations in a rapidly evolving urban environment and hot climate.

Nevertheless, the findings lead towards several recommendations to enhance user experience, encourage broader adoption, and support sustainable urban mobility, which are to:

- Enhance first-mile and last-mile accessibility by developing safe, shaded, and walkable pathways for pedestrians and cyclists, besides improving wayfinding from surrounding neighborhoods to station entrances.
- Address growing cost perception concerns by introducing a smart fare zoning to ensure short intra-city rides remain affordable.
- Improve external walkability and urban integration by prioritizing pedestrian infrastructure upgrades around key stations, besides mandating walkability audits as part of urban development near metro stations.
- Sustain and expand in-station amenities.
- Promote universal design and accessibility.
- Monitor public satisfaction regularly.
- Audit the urban design surrounding Dubai Metro stations, and their accessibility.

Finally, Dubai Metro can be considered a public transport success, and the study provides evidence to support this. However, there are still obstacles to overcome in the future as Dubai develops further, and the population continues to rise.

Author Contributions

Both authors made substantial contributions to this study. M.A. and E.M. jointly identified and selected the literature reviewed. Data collection for the three sites was conducted by M.A. Both M.A. and E.M. performed the data analysis and interpreted the results. The manuscript was drafted by M.A. and reviewed by E.M. Both authors have read and approved the final version of the manuscript for publication.

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Informed Consent Statement
Informed consent was obtained from all subjects involved in the study.

Data Availability Statement
New data were created or analyzed in this study. Data will be shared upon request and consideration of the authors.

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Conflicts of Interest
The authors declare no conflict of interest

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