IJTE, Vol. 11, No. 4, Spring 2024, pp. 1679-1704
Research Paper

Modeling the Impact of Neo-Traditionalism on Urban Quality of Life

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Received: 2023/11/25 *Accepted: 2023/12/24*

Abstract

The integrated management of transportation in the current era is multifaceted, requiring interdisciplinary cooperation in all dimensions for success. The transportation system management face new challenges due to the growth of cities and the rise of car usage. The problem can be solved with different solutions, such as referring to traditions of urbanization (neo-traditional). As part of urban planning management strategies for revitalizing neo-traditional regions, this paper examines three scenarios of traffic islands, increasing specific uses per capita, and traffic calming. Using the four-stage transportation models calibrated for the case study, Mashhad city, V-Km, travel time, CO pollutant and fuel consumption are measured. The analysis of the quality indicators affected by neo-traditionalism, which are hard to quantify, so ranking them according to fuzzy Delphi technique. Due to some shortcomings, the Ground theory method was finally used to model and identify the qualitative indicators. According to VISSUM output, the 20% increase in travel attraction resulted in a 2.82% and 1.93% reduction in travel time in zones and city, respectively. However, CO emissions have increased by 0.94% in the zones and decreased by 0.62% in the whole city. Fuzzy Delphi technique shows in scenario two, the neighbourhoods economic prosperity, social interaction, and satisfaction have the highest score. According to the Grounded theory model of neo-traditionalism in the regions, which was developed based on interviews with a significant number of elites, strengthening walking, increasing density in residential areas, connecting urban roads, and creating mixed land use are the essential strategies based on neo-traditionalism.

Keywords: Neo-traditional, Transportation Modelling, VISSUM, Fuzzy Delphi, Grounded theory

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1. Introduction

A Neo-Traditionalist movement promotes walkable, traditional communities with a strong sense of place and mixed land use. This approach, including traffic, economy, security, homes, social interaction, health, and the environment, has impacted various aspects of quality of life. Traffic conditions have improved significantly as a result of neo-traditionalism. Neo-traditional communities promote walking and cycling by creating mixed-land use and continuous streets. Therefore, traffic congestion is reduced, resulting in less stress and better air quality. In these regions, residents spend less time in their cars and more time enjoying their surroundings. Neo-traditionalism also benefits the economy. It is easier for local businesses to flourish in compact, walkable neighborhoods, which provides employment opportunities and stimulates economic growth. These communities are less susceptible to external economic shocks because they focus on smaller, local businesses. The sense of community in neo-traditional zones contributes to enhanced safety in terms of security.

As a result, crime rates are reduced, and overall security is improved since residents are more likely to know and look out for one another. In addition, well-lit streets and active public spaces are also deterrents to crime. In neo-traditional communities, homes tend to be smaller and more compact, making them more affordable. Homeownership is also more affordable due to the proximity of amenities and reduced need for extensive infrastructure. The sense of belonging and social interactions is strengthened in neo-traditional areas. A strong sense of belonging and community is fostered in these communities through public spaces, parks, and gathering areas. Health benefits are also provided to these communities. The availability of walkable streets and parks nearby promotes healthier lifestyles. Public health is further enhanced because fewer cars contribute to lower air pollution. The environment is also positively affected by neo-traditionalism. Walking and mixed-land use development reduce commute times and the carbon footprint associated with transportation. As well as conserving green spaces, these communities promote sustainable development. Adopting neo-traditionalism in urban planning and design profoundly affects quality of life. Traffic conditions have improved, the economy has grown, security has been enhanced, homes have become more affordable, social interactions have been fostered, health has been promoted and the environment has become more sustainable.

A wide range of quantitative and qualitative indicators can be used to measure neo-traditionalism in urban areas and suburban development. New policies have improved some indicators, but others have declined. City managers typically base their executive policies on a one-dimensional assessment of urban problems and issues, but according to extensive research in the past literature and experience of prosperous cities about the subject of this paper, quality of life is a multidimensional concept. Therefore, quantitative and qualitative indicators are examined here to measure the efficiency of modelling. Three methods are used here to model the effects of creating neo-traditionalism on urban quality of life by analyzing quantitative and qualitative indicators. In the case study, Mashhad metropolis, VISSUM software was used to model transportation. Based on the comprehensive transportation studies of that city, four-stage models of production, distribution, modal split, and trip assignment have been developed. Using actual statistics and data, the model coefficients have been validated by the traffic working group of Mashhad Municipality. As shown in Table (1), four quantitative indicators are used to analyze the sensitivity of selected models. It is possible to change the input parameters of the models for the case study based on the scenarios defined in

Table (2), which align with the creation of neo-traditional neighborhoods and do not conflict with each other. We simplified the scenarios so that we could better understand the effects of each action after it was implemented in the software. There is difficulty determining quickly whether the range of changes in each of the indicators is a result of an event that has changed in one scenario but not in another when analyzing the output results of the software. In addition, three scenarios created in the software are not incompatible, which means that if each scenario has positive consequences, the sum of the effects can be considered. For the development and improvement of the transportation system and the quality of urban life, several neo-traditional scenarios can be implemented simultaneously. Based on the considered indicators, the output results are then obtained using VISSUM software.

Table 1. Selected traffic parameters

Traffic indicators	Network travel time (hours)	Vehicle-km (V-km)	Emission (co) kg	fuel consumption (liter)
index number	1	2	3	4

Table 2. Selected scenarios for analyzing traffic models

Scenario specifications	base (do nothing)	Reducing speed and crossing lane in neo-traditional neighborhoods	20% increase in attracting variables works, recreational and educational trips to Neo-traditional neighborhood	40% increase in attracting variables works, recreational and educational trips to Neo-traditional neighborhood	Removal of passing traffic from Neo-traditional neighborhoods
Scenario number	0	1	2-1	2-2	3

Figures (1) and (2) show the road network and traffic zones in the study area. In Mashhad City, 23 traffic areas were determined for all scenarios. The methodology likely involved collecting traffic data and analyzing population density, land use, and road networks. Congestion levels, safety concerns, public transport access, and urban planning goals may be considered when selecting criteria. In addition to the quantitative parameters of Table (1), a wide range of qualitative parameters are also significant when examining the effects of neo-traditional neighborhoods on the quality of urban life. From a review of past scientific literature, it is clear that quantifying quality indicators is not only a difficult and time-consuming task but also inaccurate and hard to validate. As a result, neo-traditional neighborhoods are creating and developing qualitative indicators that affect the quality of urban life. Table (3) lists the most crucial quality indicators from related scientific texts and specialized experiences.

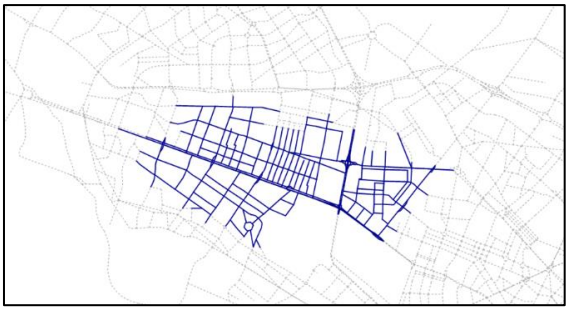

Figure 1. road network in selected case study

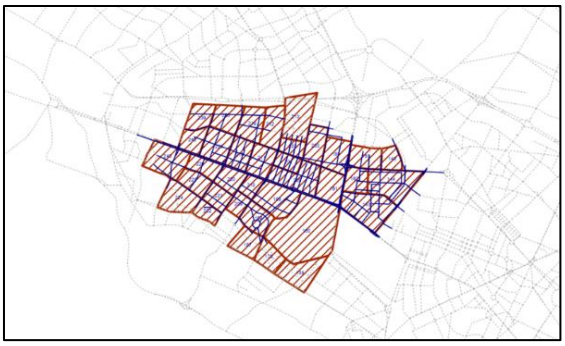

Figure 2. traffic zones in selected case study

Table 3. Qualitative indicators related to the development of neo-traditionalism and quality of life

Title	**1**	**2**	**3**	**4**	**5**	**6**	**7**
indicator	A sense of belonging and social connection	Social satisfaction and well-being	safety	Crime and delinquency	social justice	Physical changes	Sustainable Development
Title	**8**	**9**	**10**	**11**	**12**	**13**	**14**
indicator	Improving the economy of the neighborhood	Public transit	Life discipline	Stress	the environment	Vitality and freshness	Access to opportunities

According to fuzzy logic calculations and fuzzy inference systems, fuzzy Delphi is a method for reaching consensus among experts. This method attempts to better represent the experts' viewpoint by using fuzzy numbers and fuzzy calculations. For each scenario, a questionnaire form is completed by inviting scientific elites and providing explanations as necessary, Table (4). To score each indicator in each scenario, be used a Likert spectrum according to table (3).

Table 4. Questionnaire form to collect the opinion of scientific elites

Effective indicators		**Keyword (verbal variables) (Scenario No.)**						
title	indicators	very little	few	somewhat less	No comments	well	very well	quite good

A suitable method is selected for each study depending on the research topic. As a result, a deep and comprehensive study was necessary due to the need for more background theory and field research about the issue under investigation, the topic's sensitivity, and the study's focus on explaining the lives of individuals. To model the development of neo-traditionalism in the case study area, Grounded theory, one of the qualitative research methods, is used. Strauss and Corbin, (1998) define qualitative research as any research not based on statistical and quantitative operations focused on people's lives, experiences, behaviors, emotions and feelings. Qualitative data were collected using the interview method, depending on the nature of the subject.

The case study of Mashhad has been discussed in this article to compare quantitative and qualitative indicators so the results of neo-traditional development models in urban areas can be applied to similar situations in Mashhad or other traffic areas. The Grounded theory has been used to conduct an in-depth interview and to code and analyze the indicators to complete the study and examine a broader range of qualitative indicators that change due to neo-traditionalist policies in areas and suburbs of the cities. Observations, definitions, and semi-structured interviews are used to collect information. Table (5) shows the statistical details of those invited to the in-depth interview.

Table 5. statistical details of those invited to the in-depth interview for Grounded theory

Variable name	**Classification**	**Number**	**%**
gender	Man	9	64
	Woman	5	36
education	Master	8	57
	PhD	6	43
Field of Study	Urban	4	29
	architecture	2	14
	Transportation	6	43
	Sociology	1	7
	Management	1	7
job position	Manager	5	36

Variable name	Classification	Number	%
	Professor of university	9	64

The data were generated through semi-structured interviews, which are flexible and deep enough for qualitative research. To analyze qualitative data and code the questionnaire, MAXQDA 2022 software was used. Neo-traditionalism was conceptualized using qualitative analysis, coding, and categorization.

2. Literature Review

Successful research begins with a literature review. Studying the work of others correctly and systematically will enable you to define the problem precisely in the first stage and to solve the problem in the second stage. Neo-traditional areas can be designed using two types of studies, according to sensitivity analysis of traffic parameters:

- A study examines the concept of urban design, social city characteristics, the history of design, and conventional styles concerning the analysis of related parameters.
- Studies related to the development of Neo-traditional and traffic models and their application in transportation and urban planning

Urban design and improving quality of life are among the oldest problems in this field. Research has always been interested in planning and solving this problem since the 1980s in the western world and the United States of America. Through the collection of descriptive survey data, Ramzanzadeh and Shakibaeifar (2022) investigated the impact of intelligent transportation on sustainable urban development. Research is being conducted to explore a new technology in urban transportation management. According to the researchers, sustainable development is based on a statistical population of 550 traffic experts who work for the Tehran Municipality Traffic Organization. As the research results indicate, smart transportation significantly impacts the environment because it affects the environment, safety, economy, access, and mental health. Therefore, the research findings observed that intelligent transit does not have a noticeable effect on increasing local accessibility and level of service. In contrast, it has an impact on other indicators (reduction of noise pollution, reduction of air pollution, safety in driving, safety against accidents, personal safety and time between the occurrence of an accident and timely action, saving travel time, saving labor, reducing human errors, reducing administrative and supervisory costs) have a significant effect. Azizi et al. (2016) used a descriptive-analytical method, documentary and library data, interviews, and questionnaires to analyze pedestrian safety on urban roads. According to that study, a plan has been developed in which pedestrian, driver, vehicle, and street information is entered. The degree of their dangerousness is calculated based on pedestrian accidents, and recommendations are offered for reducing those accidents. According to these findings, all human factors, including pedestrians and drivers, vehicles, roads, environmental factors, and even political and social factors, contribute to pedestrian accidents. However, some of these factors do not affect the occurrence of pedestrian accidents in Tehran city.

Habibzadeh Maleki and Jangi (2015) studied citizens' attitudes toward using private cars within cities. Data collection methods are objective, applied, and descriptive-analytical in this research. All households with personal vehicles are included in this study's statistical population. This study used a multi-stage cluster sampling method due to the structure of the statistical population. Researcher-made questionnaires were used to collect data. According to the study's findings, instrumental factors significantly influence citizens' willingness to use their vehicles during intra-city travels, while social, economic, individual,

and cultural factors play the second to fifth roles.

In Iran, the trend towards neo-traditional is very intense because of the neo-traditional movement's quest to solve urban problems, provide a strategy for revitalizing the city, reconfigure disembodied suburbs, and protect the environment.

As part of a study by Ajza Shokouhi et al. (2021), physical-spatial indicators were compared with neo-traditional urban approaches. It has been observed that neo-traditional has emerged in recent decades in an effort to make cities and small communities more desirable in terms of walking, life, and transportation. Using GIS software and a hierarchical hybrid model, stability was measured. As indicators, we consider the type of road, sidewalk width, land use, number of residential floors and access to public transportation, and the size of residential blocks. In the Mashhad metropolis, results were analyzed from two traditional and planned neighbourhoods. The results show that the scheduled region had about 68% moderate stability, while the conventional area had 71% stability and 29% instability. Therefore, neo-traditional approaches should be applied to traditional and organic urban planning based on the physical-spatial indicators of new urbanism.

Neo-traditional urban structures have been introduced and analyzed by Eugene McCann (2015). A neo-traditional neighbourhood is designed on a small scale, with narrow streets and more minor setbacks like some older neighbourhoods. According to the author, the neo-traditional housing market emerged due to the recent restructuring and fragmentation of the outskirts housing market.

Michael Aron Berman (1996) examines the transportation effects of Neo-traditional. At the beginning of this century, neo-traditionalist development emphasized the return to the checkerboard network of streets and pedestrian development. Those who support this method claim that this will encourage walking and reduce the use of private cars. To reduce V-Km significantly, the neo-traditional development must provide access levels competitive with suburban areas. Neo-traditional neighbourhoods have a large share of activities within walking distance, so people do not need cars for this important thing. Less commercialized communities are likely to see more shopping trips, and neo-traditional developments are likely to see a decline in car use for non-business trips.

An article by Tanvir Hassan et al. (2014) discusses the design of neo-traditional neighbourhoods, focusing on improving walking and cycling. A controversial topic in transportation planning today is neo-traditional area design, which calls for creating communities reminiscent of old cities. In the neo-traditionalist view of society and cars, walking and public transportation are preferred modes of transportation that are more environmentally friendly. Rather than building old and obsolete developments in the suburbs, neo-traditionalists seek to integrate and rearrange them into new urban centres. Compared to the typical fringe results of recent decades, this design offers an improved model for transportation-oriented uses. Here are the key components:

- Public transportation should be made more accessible
- More concentrated business centres
- A continuous street network without dead ends and radial paths

The article "Building a Driving Model Based on the Impact of Neo-Traditional Neighborhood Design on Residents' Daily Travel Patterns" was published by Xiong Bin and White (2012). Automobile use is often criticized in post-World War II suburbs. In addition to traffic congestion, air pollution, reliance on private cars, and a lack of public transportation, one of the main problems is the reduction of social interactions. Newer designs, like neo-traditional and grid designs, address these issues. However, the pattern of neighbourhood travel

and traffic is determined by individual choices. Traditional urban planning strategies often need to be revised to address such phenomena. This paper developed and calibrated a user-based journey and traffic simulation model by taking into account:

- Personality traits
- Preferences and feedback from pedestrians and vehicles
- Number of vehicles on the road

Pedestrians in two cities, Ottawa and Ontario, benefit more significantly from neo-traditional network designs with fewer intersections, shorter access distances to facilities, and lower emissions. According to Werdum (2012), neo-traditionalist urbanism has unintended consequences. In addition to encouraging development outside traditional urban centres, the automobile also minimized the need to combine multiple intensive land uses in regions. It contained a small collection of commercial stores to serve the relatively few residents who lived and worked near the neighbourhood, contrary to the traditional design. Sub-components of this form of urban growth are also referred to as transit-oriented design (TOD), new urbanism, walkable streets, innovative development, and sustainable communities.

The disadvantages of sustainable urban development on transportation have been examined by Yigitcanlar et al. (2010). There is a link between urban sprawl and low density worldwide, especially in North America and Australia. It is difficult for those without access to a vehicle or public transportation to get around in suburban areas, especially if they do not own a car. However, the problem of unsustainable urban transportation needs to be adequately addressed by current urban and transportation models. In society, it is mainly experienced by the disadvantaged, whose adverse effects are not taken into account. Population, environment, and transportation are all factors that contribute to the transportation of deprived areas. Most transportation models, however, focus solely on the disadvantages of transportation and neglect demographics, transportation services, and spatial dimensions. This article examines the relationship between sustainable urban development and transportation.

Using the urban environment and landscape to improve physical and mental health has been studied by Bagheri and Azemati (2008). As a result of chronic urban and environmental diseases, citizens are less safe from accidents, less secure in their urban and residential areas, more isolated, depressed, and socially broken, and more dependent on cars and inactive in different states. Sustainable urban design aims to design open spaces and metropolitan areas for citizens' comfort and health. In recent years, sustainable urban design has proliferated, especially in developed countries, and provides design solutions and criteria for citizens' comfort, health and safety. Using sustainable urban neighbourhood design and improving the quality of urban space and residential areas can improve the public health of citizens, according to the authors. Based on this, the design of local open and green spaces, the planning of pedestrian urban spaces, the creation of dense neighbourhoods with mixed residential, commercial and office uses, the implementation of intermediate urban plans in open and unused areas, increasing the physical and visual access of residents to nature, creating opportunities cultural-social and commercial-entertainment in the neighbourhood, reducing the dependence urban life on cars by equipping neighbourhoods with public transportation such as neighbourhood schools, developing the public transportation network, and improving the quality of collective spaces in local centres according to population groups using sustainable strategies for Improving public health and safety in the urban environment is known.

In a case study conducted in Tehran city, Barati and Sardareh (2012) investigated the effects of urban form indicators on the amount of private

car use and energy consumption. According to them, evaluating urban planning policies in terms of their impact on energy consumption and emissions is one way to reduce the consumption of fossil fuels and thus reduce air pollution. In big cities, urban form indicators have a greater than 10% impact on energy consumption amounts. Control variables include economic and social indicators. Based on 300 randomly selected residents of Tehran, we collected economic, social, and travel information, as well as the urban form index of their neighbourhood. We extracted the correlation between these indicators and private car distance travelled based on regression analysis.

As described in the article by Ebadinia et al. (2016), the intensity of land use impacts transportation sustainability in Mashhad. Increasing the types of urban densities and occupations will cause more compaction of the city form and reduce the distance travelled by private cars, reducing the emission of environmental pollutants. This is believed to be an influential factor in residents' travel patterns. According to the results, land use (density) and V-Km travelled decreased significantly as land use (density) increased, and V-Km travelled, and carbon dioxide emissions decreased significantly (0.845).

Analyzing the relationship between objective and subjective variables in foreign studies and urban quality shows that an essential part of the findings is that there is a significant correlation between objective and subjective variables in selected foreign studies and urban quality:

- The study of Laura and Powell (2011) showed that urban safety and security are also important factors affecting urban quality of life. The availability of basic infrastructure, such as electricity, water, sewage treatment, garbage collection, and telephone, is also essential.
- Moin al-Dini et al. (2015) concluded that the five variables of feeling safe in the city, feeling satisfied with health and treatment services, feeling satisfied with the condition of streets and buildings within the neighbourhood or unit, satisfaction with public transportation in the city and finally the presence of retail shops sales play the most critical role in urban life satisfaction.
- Mouratidis (2020) showed that satisfaction with movement, the neighbourhood unit, and satisfaction with housing is positively correlated with urban quality of life. Satisfaction with movement and neighbourhood units positively influences life quality, happiness, and well-being.
- The study by Sapna et al. (2021) found that education, mortality rate, income, employment, and other life quality indicators can be determined by the spatial structure of cities and social and economic variables related to life quality. In some cases, the spatial pattern of the cities can be explained by measures related to the type of urban structure and the town's land use.

Zakharova et al. (2022) have presented an article titled "Building a Safe Transportation System" as a strategic goal for achieving a high quality of life. According to the author of this article, a key component of improving life quality is the development of national transportation systems. The quality of life can be enhanced by balancing traffic and integrating transportation systems, ensuring traffic safety, monitoring vehicle conditions and economic productivity. Due to the mandatory technical inspection of vehicles, there is a conflict of interest in ensuring the safety of people.

In his article, Ayoub Sharifi (2016) examines sustainable development in modern urbanism. A five-pronged approach to urban planning is discussed, including garden design, neighbourhood units, modernism, neo-traditionalism, and eco-urbanism. To achieve sustainable development, urban planning at the neighbourhood scale is essential. A neighbourhood planner must consider the characteristics of different neighbourhoods and their social, economic, environmental, and

technological differences to comply with sustainability rather than adopting prescriptive designs.

Milakis et al. (2015) have investigated various scales of urban form. To demonstrate the results of their research, they used San Francisco Bay as a case study. This study examines whether neighbourhood design is better than urban planning based on a regional and macro perspective. This article aims to examine local and regional characteristics of urban form and vehicle travel. Multilevel logit models were fitted for the San Francisco Bay Area to assess V-Km travelled and vehicle trip frequency (for work, shopping, and social/recreational purposes). Because V-Km travelled in San Francisco Bay is significantly lower in the neighbourhood than in the region, they conclude that interventions at the regional scale will contribute more to the goal of reducing V-Km. However, local design policies may also be necessary.

T Sen Kwa and Grant (2012) have published an article entitled "Modern Urbanization and the Growth of Smart Mobility". An explanation and interpretation of new urban development, sprawl, sustainable communities, and the concept of sustainability are presented in this article. Whether modern urban planning and intelligent growth of tools provide conditions for sustainably guiding development is the main question addressed in this research. There needs to be more evidence that modern urbanism can significantly alter low-density, car-centric development patterns. As a result, there has been a growing commitment to new forms of development that protect open space and farmland, revitalize communities, provide more affordable housing, and enhance transportation.

An individual's quality of life is defined as how satisfied he feels with his environment (Mulligan et al., 2004). This type of satisfaction affects a person's happiness and peace, his behaviour in front of others, and his physical and work abilities. In the last few years, social sciences (Diener & Biswas Diener, 2011) and economics (Lambiri et al., 2007) have studied the issue of measuring and evaluating people's life quality.

Ching-Hsue Cheng (2022) introduced a simple fuzzy group decision-making method. This paper presents a methodology for aggregating expert opinions using trapezoidal or triangular fuzzy numbers. Experts adjust their fuzzy ratings using the Delphi method to ensure consensus. A fuzzy number is used to calculate the mean of fuzzy ratings and weights in the aggregation of opinions. Fuzzy decision matrixes are constructed and ranked in the context of multi-alternatives and multi-attributes. By evaluating aggregate fuzzy numbers, the proposed ranking procedure facilitates the selection of the best alternative for any given situation. In the conclusion, a simple fuzzy group decision-making algorithm is presented for evaluating alternative systems.

Beheshtinia and Ahangariean (2017) developed a novel hybrid decision-making method as part of a technology transfer project in roller concrete road pavement. Competitive markets emphasize the importance of technology transfer for organizations, firms, and governments. The paper proposes an innovative method for enhancing transfer effectiveness using Modified Digital Logic (MDL) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The Delphi method is used to identify criteria and alternatives affecting technology transfer. TopSIS prioritizes alternatives based on MDL's assessment of attribute importance. It emphasizes human resource capability, technological awareness, and equipment provision as critical factors for transferring roller concrete road pavement technology. Technology transfer in roller concrete road pavement is optimized by purchasing technical knowledge, forming joint ventures, and importing capital goods.

In Steve Adolph et al. (2011), grounded theory extracts insights into problem-solving approaches from data. Although Grounded

Theory seems straightforward, implementing it in research can be challenging. Despite numerous social sciences and nursing papers, software engineering researchers need examples. A software engineering context for classical (Glaserian) Grounded Theory is presented in this paper. Software engineers can use this model to clarify fuzzy definitions interpreting classical Grounded Theory canons. The authors provide fifteen guidelines for software engineering researchers navigating Grounded Theory methodology based on lessons learned and valuable insights.

Judith A. Holton (2009) published Grounded Theory as a paper. When conducting a classic grounded theory study, individuals trained in grounded theory face challenges of "unlearning" qualitative data analysis norms. Grounding theory is erroneously classified as purely qualitative in research methods textbooks and academic papers. The paper focuses on overcoming preconceptions and moving beyond descriptive details for novice grounded theorists. In contrast with authoritative perspectives, grounded theory emphasizes the discovery of conceptually abstract theory through empirical data, countering authoritative perspectives that are likely to hinder its understanding as a distinctive methodological approach.

To determine whether the Neo-Traditional method of promoting New Urbanism is as effective as the Delphi Fuzzy or Grounded Theory, traffic models are integrated with advanced decision-making techniques such as Delphi Fuzzy and Grounded Theory. Various aspects of urban transportation, including congestion, accessibility, and sustainability, can be assessed using traffic models. Traffic flow, pedestrian accessibility, and environmental factors can be assessed quantitatively using these models.

It is beneficial for handling uncertainty and subjective judgments in Delphi Fuzzy. Experts can assess the selected indexes and assign qualitative values to different scenarios, which helps account for urban design's nuanced and multifaceted nature. An expert opinion and preference elicitation and aggregation process is provided.

Unlike quantitive theory, grounded theory provides insights and theories based on empirical evidence. Research can be conducted using this technique to draw valuable conclusions about Neo-Traditional methods for New Urbanism based on the results of traffic models and the Delphi Fuzzy approach. Observations and experiences from the real world are used to support the findings in this approach.

A rigorous and holistic assessment of selected indices can be achieved by combining traffic models with the Delphi Fuzzy technique and the Grounded theory. Using Neo-Traditional methods, urban planners and policymakers can use this method to design more sustainable, walkable, and livable urban environments.

3. Methodology

A variety of qualitative and quantitative indicators are analyzed and investigated in this article using the following three methods:

- An analysis of quantitative indicators compared to scenarios in VISSUM software (for the case study)
- In a case study, the fuzzy Delphi technique is used to compare qualitative indicators to scenarios
- The Grounded theory (neo-traditional macro-scale development modelling for quality indicators)

The development of neo-traditionalism in suburban areas affects some indicators of urban quality of life, as was mentioned earlier. Indicators are classified into two categories, quantitative and qualitative, so the quantitative indicators have been analyzed using a four-stage transportation model and scenarios defined in Table (2). The model has been implemented on the roads of Mashhad city's selected areas. In order to enhance the quality of life in neighbourhoods embracing Neo-

traditionalism, it is crucial to measure the quantitative improvements in traffic indicators. Planning and urban management have always been concerned with improving the quality of urban life and transportation parameters. In recent years, planners in different parts of the world have implemented neo-traditional solutions to solve rural-urban socioeconomic problems in suburban areas of modern cities. In order to determine the effects of implementing various solutions, modelling is one of the well-known scientific and practical tools. As well as a well-known and reliable model, this possibility has a long history in transportation. Classic four-stage models have examined production, distribution, modal split, and trip assignment using field surveys, statistics, and socioeconomic information. Figure (3) shows a general overview of the modelling process.

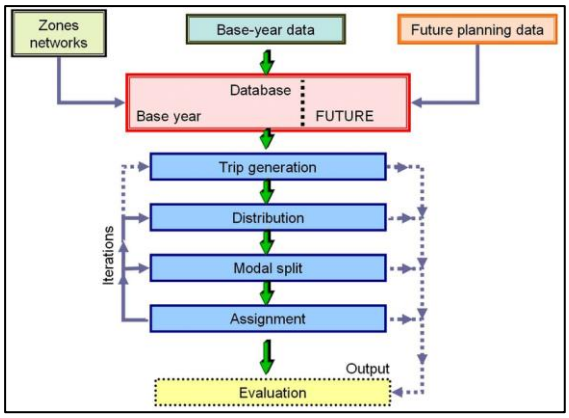

Figure 3. 4-steps transportation modeling process

Figure 4. Mashhad Road network model

In the first stage, the four-stage transportation model (trip production, trip distribution, modal division, and trip assignment) used to examine quantitative parameters in the development of neo-traditionalism is based on comprehensive transportation studies of the city of Mashhad, and its coefficients were calibrated, as a result of examining qualitative parameters of that city. The model's output is analyzed based on the scenarios that include management changes to create neo-traditional neighbourhoods. PTV-VISSUM software has been used to collect supply information and demand forecasting models to identify the effects of scenarios on Mashhad's transportation indicators. Simulation of Mashhad city's route network is shown in Figure (4).

3.1. Introduction Scenarios

Some conditions for creating neo-traditional regions were determined by implementing practical scenarios. The four scenarios can be implemented simultaneously and do not conflict.

3.1.1. Base Scenario (Current Situation)

Using Mashhad city as an example, VISSUM software is implemented for the current status of the city's transport parameters. In the rest of the scenario, the four-stage transportation model output results will be compared with the results of this scenario.

3.1.2. Correcting Supply Variables Through Traffic Calming is the First Scenario

As a result of reducing speed and crossing lanes, it has been used in some way to reduce speed on the roads of the studied area and to calm the traffic at the local level. The internal roads of the studied localities were reduced by 20% in free flow speed and by one lane (equivalent to a reduction in capacity). Figure (5) shows that Mashhad city roads can implement the first scenario within the case study.

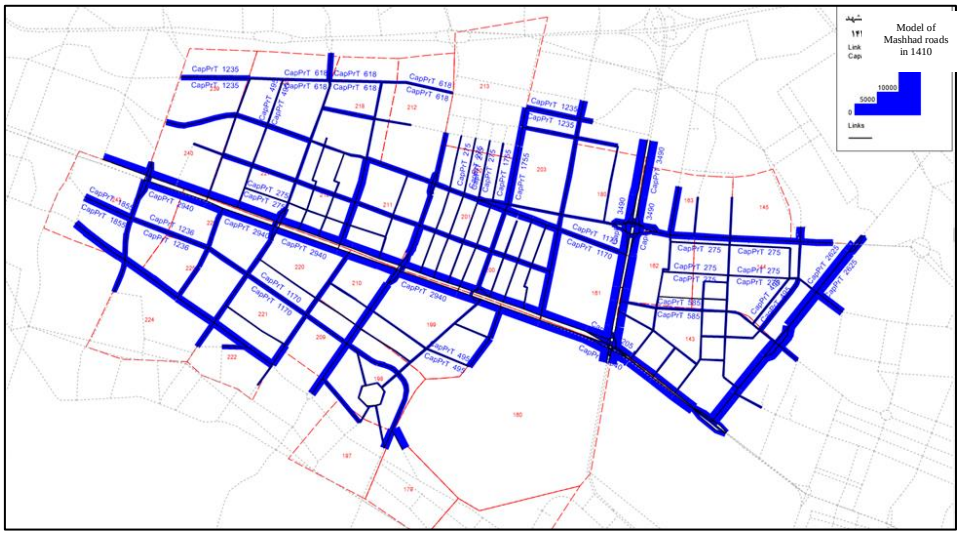

Figure 5. Modified capacity of the studied passages in the model (scenario 1)

3.1.3. The Second Scenario (Modifications to Travel Attraction Variables) is as Follows

The second scenario involves changing loadings according to traffic areas in urban zones. The types and density of uses in the localities of the cities are responsible for the trips made there. By reforming the characteristics of the users in the localities, it is possible to reduce trips to the localities and plan according to their social role. As a result, citizens will be more productive if their daily travel needs are met within the same neighbourhood (a set of traffic zones). It is therefore possible to control travel in traffic areas using models of travel attraction.

3.1.4. The Third Scenario (Eliminating Passing Traffic from Neighborhoods)

Eliminating passing traffic from roads in urban areas is one of the most essential methods of developing neo-traditionalist ideas in transportation studies. This means only vehicles with origins or destinations in the city's traffic zones should use roads in its. Those vehicles with origins and destinations outside the areas cannot use the inner streets of the neighbourhood. To apply this scenario to the macro transportation model, a new variable (UDA) was defined as travel resistance in links connecting the case study to the city network. For example, Sajjad areas connecting links are shown in Figure (6). In the allocation phase, vehicles will choose alternative routes (outside the area) if this variable is applied (instead of using connecting passages).

3.2. The fuzzy Delphi Technique

A fuzzy Delphi technique is a collaborative method for gathering expert opinions. A panel of experts in a specific field presents their opinions on a specific issue using fuzzy concepts. In mathematics, fuzzy logic or concepts model uncertainty and ambiguity in data and information. Rather than having exact values, these values are defined by their degree of membership in a fuzzy set.

Figure 6. location of the connecting links of Sajjad neighborhood in the case study of Mashhad

The fuzzy Delphi method has been used to analyze qualitative indicators and investigate the impact of neo-traditional development policies in different localities of the article's case example. A questionnaire form is provided for the qualitative indicators in Table (3), and elites and scientists related to the subject have been requested according to the explanations provided in advance and considering the possibility of creating localities for each scenario defined in Table (2). Each qualitative indicator resulting from neo-traditionalism is scored on a Likert scale. Additionally, each elite can add qualitative indicators to each scenario when completing the form. These indicators are essential in creating neo-traditional neighbourhoods and are not included in the form. Accordingly, Table (3) shows the final list of quality indicators based on the opinions of scientists and researchers. The asymmetrical fuzzy number for each Likert scale is in Table (6). The fuzzy numbers are extracted from official sources of fuzzy logic.

Table 6. Likert scale, verbal variables, and fuzzy numbers

Likert scale	very little	few	somewhat less	No comments	well	very well	quite good
quantitative number	1	2	3	4	5	6	7
Corresponding triangular fuzzy number	0,1,2	0,1,3	1,3,5	3,5,7	5,7,9	7,9,10	9,10,10

Fuzzy Delphi uses triangle fuzzy numbers to fuzzified arithmetic numbers corresponding to the Likert scale, as shown in table (6). The fuzzy Delphi method is illustrated in Equation (1) by calculating the triple limits of the points given by the scientific elites to each index.

$$Y = (\sum_{i=1}^{n} X_i !)^{\wedge(\frac{1}{n})} \quad (1)$$

Where in:

Y: Fuzzy number from the Likert spectrum,

X: The verbal number corresponding to the Likert spectrum,

n: Number of participants,

!: factorial number.

Equation (2) provides the arithmetic mean of each index's lower, middle, and upper limits. Defuzzification refers to this process.

$$Y = (X + 4B + C)/6 \quad (2)$$

Where in:

Y: De-fuzzified number,

X: The lower limit of the index fuzzy number,

B: The middle limit of the index fuzzy number,

C: The upper limit of the index fuzzy number.

3.3. (Grounded Data Theory), Research Method Process

A conceptual model of neo-traditionalism was developed from qualitative analysis, coding, and categorization. Ground theory involves the following coding steps:

- Getting started: Open coding
- Axial coding is the second step
- In step three, selective coding is applied [Saldana, 2009].

In open coding, by line-by-line analysis of the interview text, codes are assigned to phrases and sentences, and then by categorizing the codes, primary concepts are extracted. A subcategory was developed by comparing and categorizing the concepts based on similarities and differences, and then a category was created by comparing and classifying the subcategories again. Figure (7) shows the frequency of central codes, showing the repetition of this concept throughout the interview. It is the category of livability with 39%, followed by sustainability with 24%, human realm with 22%, and resilience with 13%.

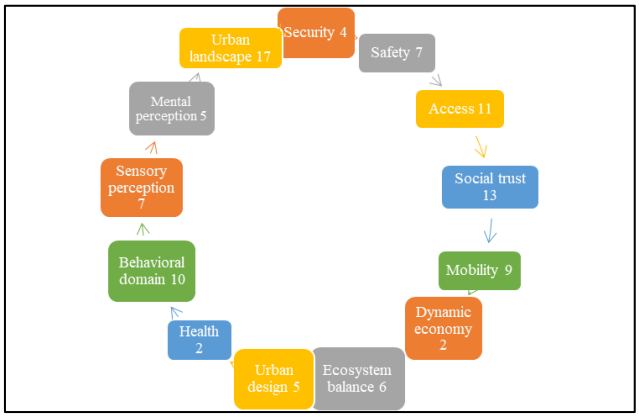

Figure 7. the frequency of core codes is shown as a percentage

In Figure (8), the concepts resulting from the analyses are shown as selective and central codes. They include four objective dimensions (viability), mental (meaning in the sense of place), environmental (resilience), and economic and social stability (sustainability). Among these concepts, livability and numerous open codes have taken the lead.

Finally, logical relationships were established between the codes and classes extracted by the researchers to construct a conceptual model of neo-traditionalist themes and sub-themes. According to Figure (9), concepts and sub-themes are related in the neo-traditionalism model.

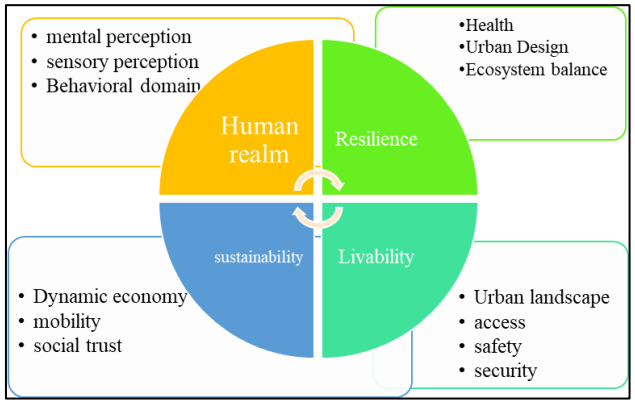

Figure 8. Concepts from the analysis

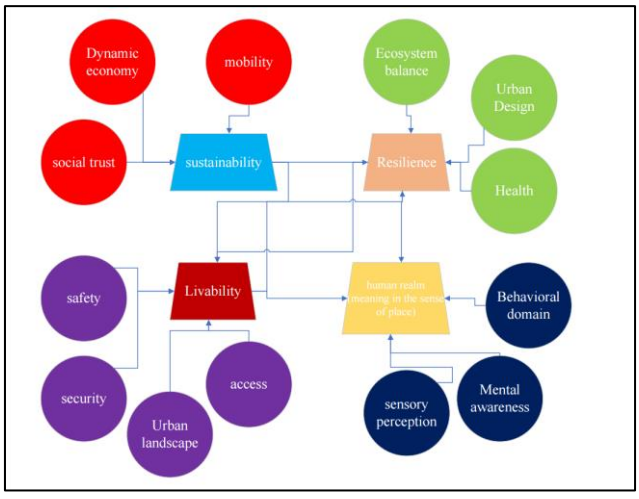

Figure 9. shows a way to communicate the components of the neo-traditionalist model

4. Results and Discussion

4.1. Modeling Neo-Traditionalism Using Quantitative Indicators

The effectiveness of Mashhad's intra-city travel demand network has been assessed based on the changes mentioned in Table (2) in the four-stage models in the horizon of 1410. Analyzed indicators include travel time in the network (hours), vehicle kilometers travelled, CO[1] emissions (kilograms), and fuel consumption (liters), which can indicate the performance of the network and environmental consequences. In the second scenario, the variables affecting the attraction models of different travel purposes have been changed. The Mashhad city network model was modified to implement these changes by increasing the selected variables by 20% - 40%. On the roads under study, Figures (10) and (11) illustrate the volume levels in the morning peak hour for the study horizon years (1405) and (1410). The effects of the scenario implementation on travel time, V-Km, CO emissions, and fuel consumption have been compared based on the modelling results. In the tables (7) and (8), we compare scenario two with the base scenario. It is possible to see the graphical changes of the indicators in figures (12) and (13).

Table 7. Results of scenario two (20% increase in per capita level of attracting trips)

	Network travel time (hr.)		Vehicle-km		Emission Co (kg)		Fuel consumption (liter)	
	Whole city	Case study	Whole city	Case study	Whole city	Case study	Whole city	Case study
Base scenario	168840	32937	4048864	337671	234194	29847	490539	71230
increase 20% in absorption variables	165588	32009	4043746	341922	232744	30129	485032	69969
Percentage change	-1.93	-2.82	-0.13	1.26	-0.62	0.94	-1.12	-1.77

Figure 10. morning peak traffic volume in scenario two - 20% increase in variables

[1] - Carbon monoxide

Figure 11. morning peak traffic volume in scenario two - 40% increase in variables

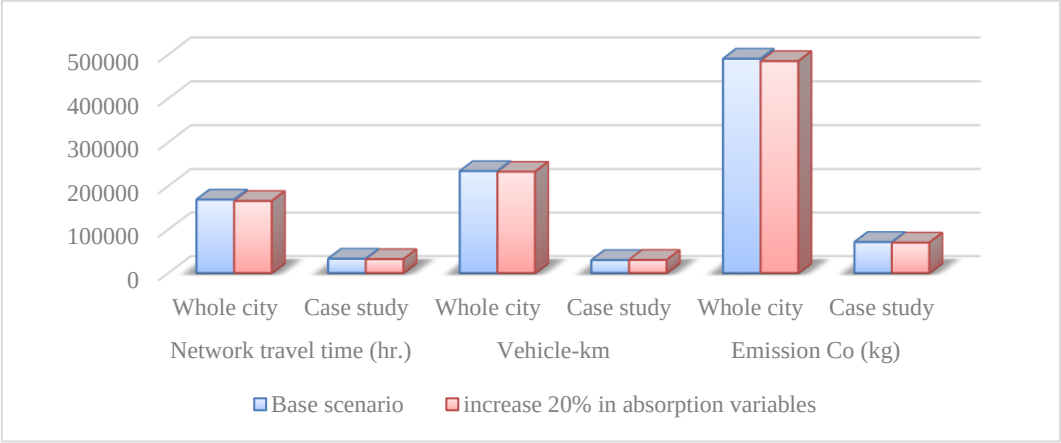

Figure 12. Chart of indicators in scenario two compared to the base (20% increase in users per capita)

Table 8. results of the scenario two (40% increase in the per capita level of attracting trips)

	Network travel time (hr.)		Vehicle-km		Emission Co (kg)		Fuel consumption (liter)	
	Whole city	Case study	Whole city	Case study	Whole city	Case study	Whole city	Case study
Base scenario	168840	32937	4048864	337671	234194	29847	490539	71230
increase 40% in absorption variables	162100	32233	4071820	362622	233767	32873	480943	71449
Percentage change	-3.99	-2.14	0.57	7.39	-0.18	10.14	-1.96	0.31

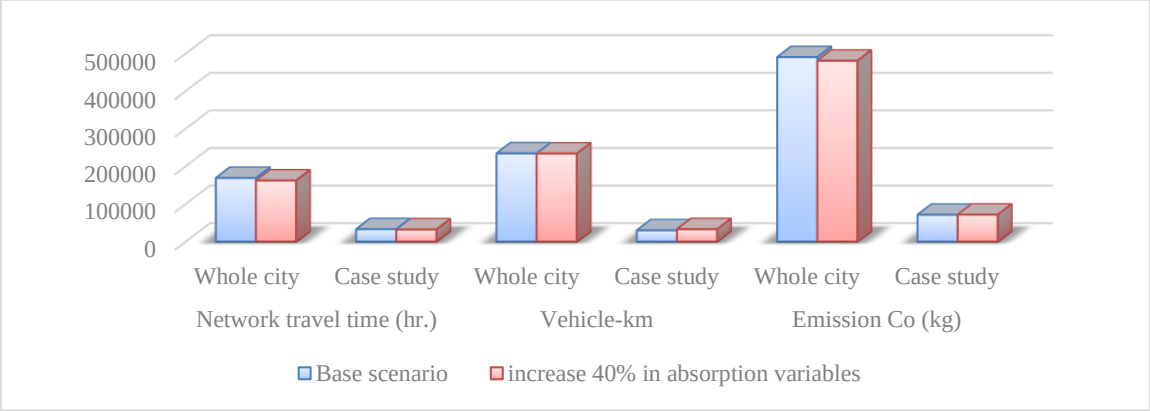

Figure 13. Chart of indicators in scenario two compared to the base (40% increase in users per capita)

Table 9. results of scenario three (elimination the traffic passing through neighborhoods)

	Network travel time (hr.)		Vehicle-km		Emission Co (kg)		Fuel consumption (liter)	
	Whole city	Streets inside the neighborhoods	Whole city	Streets inside the neighborhoods	Whole city	Streets inside the neighborhoods	Whole city	Streets inside the neighborhoods
Base scenario	168840	12754	4048864	122528	234194	10851	490539	27137
elimination of traffic passing through localities	210083	18419	4079046	58094	246094	7014	558489	32761
Percentage change	24.43	44.42	0.75	52.59	5.08	35.36	13.85	20.73

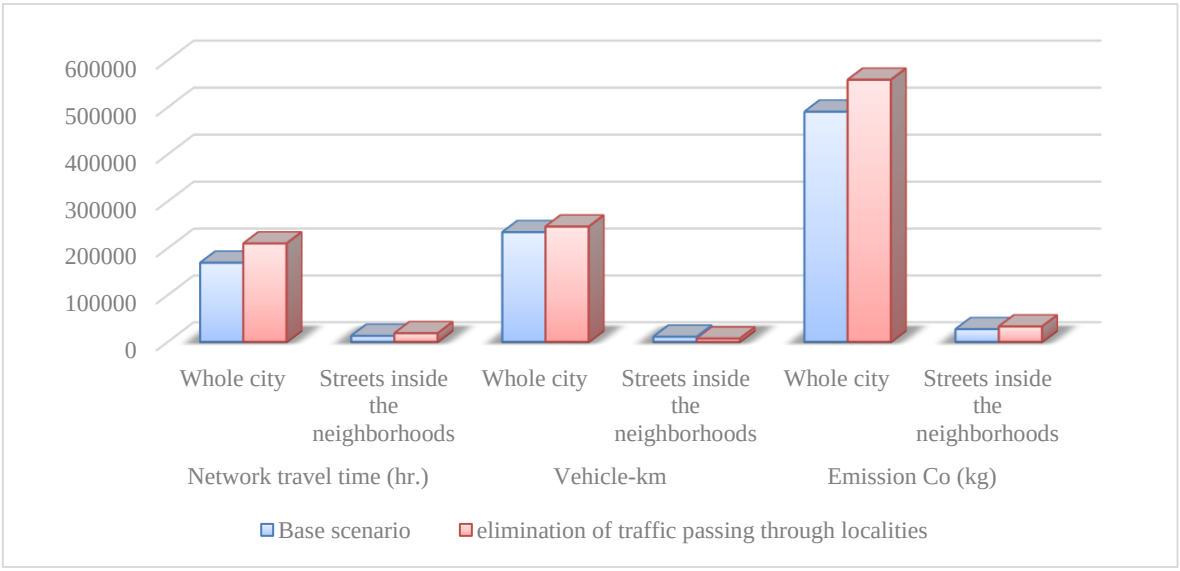

Figure 14. Graphic changes chart of indicators in scenario three compared to the base scenario

Table 10. results of scenario one (reducing speed and number of crossing lanes in neighborhoods)

	Network travel time (hr.)		Vehicle-km		Emission Co (kg)		Fuel consumption (liter)	
	Whole city	Case study	Whole city	Case study	Whole city	Case study	Whole city	Case study
Base scenario	168840	32937	4048864	337671	234194	29847	490539	71230
Reducing the speed and number of lanes	199475	59700	4052844	310282	241819	33519	540015	112783
Percentage change	18.14	81.25	0.10	8.11	3.26	12.3	10.09	58.34

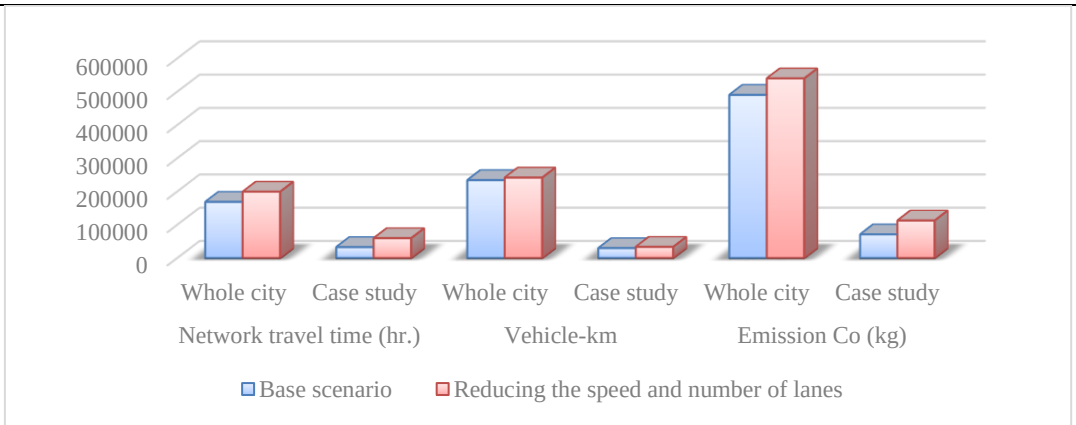

Figure 15. Graphic changes chart of indicators in scenario one compared to the base scenario

The third scenario eliminated traffic passing through the internal roads of the areas by defining the travel resistance on the selected links of the network. In order to calm traffic inside neighbourhoods, these reforms were applied to the studied network model. This Figure (16) illustrates the morning peak hour traffic volume on the roads under study from the study horizon year (1410).

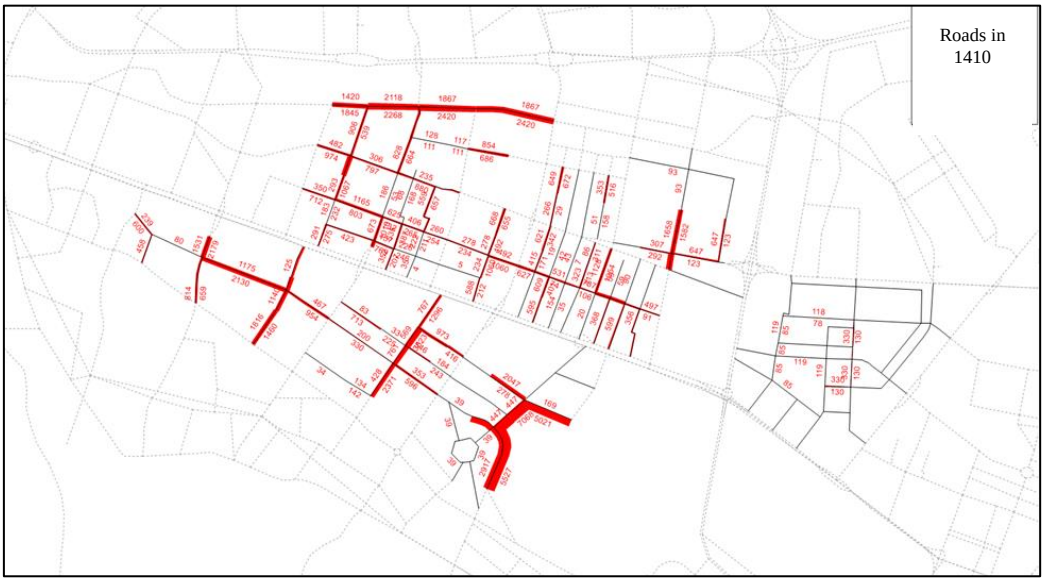

Figure 16. volume of traffic at the morning peak of the horizon in the internal roads, scenario 3

Figure 17. traffic volume passing through the roads in the base scenario (do nothing)

Figure 18. traffic volume passing through the roads in scenario three

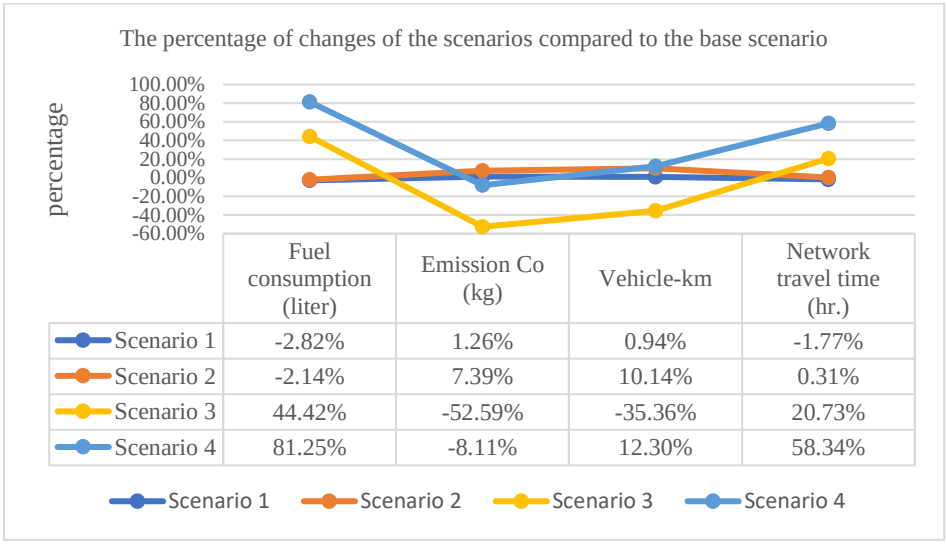

Figure 19. VISSUM software indicators changes and the results of applied scenarios in Mashhad city

Furthermore, Figures (17) and (18) illustrate the amount of traffic that passes through the network before and after third scenario implementation. When traffic passing through neo-traditional areas is prohibited, border crossings in the selected zones increase, as can be seen. Figure (19) shows the percentage changes of four selected indicators over different scenarios. By applying the first and second scenarios, the travel time in the study area is reduced by 2.8% and 2.14%, respectively. The proximity of the work,

shopping, and leisure destinations will cause this event to occur by walking or driving, depending on the dimensions of the neo-traditional neighbourhood. Compared to the base state, the mentioned index is increasing in the third to fourth scenario. When passing lanes and speed on local streets are reduced, travel time will increase, and when passing traffic is eliminated from localities, urban roads in the studied area will become silent. As a result, the attractiveness of using a private car in software models will increase, resulting in a 95% and 44% increase in travel time. In the results, CO pollutant emissions change depending on the travel time. There has been an increase in pollution in the other scenarios due to more traffic or higher traffic density, except in the fourth scenario, where pollutant emissions have decreased by 35%. In the second scenario, the neo-traditional neighbourhood and the entire city experience a slight decrease in fuel consumption. As a result of the creation of attractions for general travel purposes in areas, there will be a reduction in vehicle kilometres travelled and, therefore, fuel consumption. Compared to the base scenario, vehicle kilometres travelled in the entire city decreased in the first scenario and remained nearly unchanged in the second one. Travel-absorbing uses have increased by 40% in neo-traditional regions, so there is no reason to change. Due to the increased use of walking and bicycles for travel, this index decreases significantly in the third to fourth scenarios. By reducing the speed and crossing lines in the suburbs and crossing the district borders, traffic crossing the district boundaries is reduced, which decreases the desire for private cars. All of these factors are considered advantages and will result in traffic reduction. In eliminating passing traffic in the city, travel time, v-km, pollution, and fuel consumption have all increased. As a result of the increased volume of border crossings following the implementation of the third scenario, traffic increased, which resulted in an increase in other consumption indicators, including fuel consumption, travel time, and pollution, in the comparative state of the entire city.

4.2. Fuzzy Delphi Analysis of Qualitative Indicators

In this method, questions are asked until the difference between the defuzzied numbers of each index tends to zero in each scenario compared to the previous one. A fuzzy Delphi rule will select indicators whose de-fuzzified number is more significant than seven. The researchers conducted three rounds of questioning of scientific elites, analyzed the questioning form using fuzzy Delphi logic, and selected the final qualitative indicators using Table (11).

Table 11. final results of the fuzzy Delphi technique for quality indicators

Title	Indicator	Scenario 1	Scenario 2	Scenario 3
1	A sense of belonging and social connection	3.46	9.57	7.65
2	Social satisfaction and well-being	6.65	9.31	8.66
3	safety	9.83	7.41	9.83
4	Crime and delinquency	8.78	5.04	9.16
5	social justice	6.45	6.85	5.85
6	Physical changes	3.06	8.55	3.81
7	Sustainable Development	6.63	8.55	8.3
8	Improving the economy of the neighborhood	4.65	8.81	2.09
9	Public transit	3.3	6.08	3.69
10	Life discipline	8.69	7.75	8.41
11	Stress	9.57	5.94	9.7
12	the environment	5.88	9.04	5.78
13	Vitality and freshness	1.34	1.05	1.54
14	Access to opportunities	4.19	7.65	4.72

According to Table (11), neo-traditionalism is positively influencing indicators such as reducing accidents, reducing crime, enhancing discipline in life and driving, and reducing family stress in selected areas when traffic calming is implemented as one of the policies to implement neo-traditionalism. In other words, and according to the scientists invited to answer questions, neo-traditional area will likely improve the indicators listed with a high score. A survey found that implementing the second scenario (increasing per capita land use) contributed the most to improvement and impact in qualitative indicators. Some things selected with high scores by the scientific elite include increasing social interactions, improving well-being, and reducing adverse environmental effects. In addition to improving life order, reducing stress, and increasing traffic safety, creating traffic islands (the third scenario) can confirm the non-conflict theory. Finally, it can be said to create neo-traditional areas, more than one scenario can be used.

4.3. The Neo-Traditionalist Development Model for Improving Urban Life and Transportation

Based on the obtained concepts and categories and focusing on the central class, the Grounded Theory's foundation can be presented. The method shows the relationships between categories through a story and a visual model. While most interviewees were positive about modernization and modern identity, they viewed achieving this type of identity as conflicting with some traditional values. One of the most critical recent models of contemporary urban neighbourhood planning is investigating the principles of neo-traditionalism. All over the world, this model influences planning at full levels of human societies, from blocks and streets to regions and metropolises. There have been some principles proposed for residential developments.

4.4. The Principles of Neo-Traditionalism are as Follows

Following the citizens' wishes and to improve the quality of life, twelve fundamental principles for creating neo-traditional areas have been developed in Table (12). There is a description of the table that includes the characteristics of the principles, the components of the quality of urban life, and the solutions for implementing them in the suburbs.

Neo-traditionalism promotes the creation of relatively high-density, walkable, and mixed-lands use, a combination of architectural styles, smart growth, opposition to scattered developments, and public transportation-based sustainable urban development. It is considered a necessity for sustainable urban development to apply these principles to the planning of urban regions by experts and urban planners. In order to achieve effective planning in contemporary urban zone, it is necessary to identify these principles and their advantages as well as implementation solutions.

In the current situation, neo-traditionalism is a reaction to modernism's effects on traditional societies. Car dependency and unbalanced city development are characteristics of modern societies. By examining the existing conditions of cities and strengthening traditional foundations, this model aims to improve citizens' quality of life.

This theory aims to improve the quality of life by modifying the artificial environment. As well as creating pedestrian places and urban communities with varied activities within walking distance. As a result, societies will reach a utopia with various people, forms, and meanings. In Neo-traditionalism, strategies based on traditional neighbourhood forms are supported. Living in such regions improves the sense of local community and the quality of life in all dimensions. Figure (20) depicts the development model of neo-traditionalism for improving urban life and transportation.

Table 12. twelve basic principles related to the creation of neo-traditional neighborhoods

title	The principle of neo-traditionalism	Property	Quality of life indicators	Procedure
1	walking	Reduce travel	Transportation	Shopping centers within walking distance
		Reduce pollution	Health	Mixed uses
		Improve health	Environment	
2	Creating a network of continuous roads	Continuation of the traffic of the people of the region	Transportation	Strengthening local road infrastructure
		Development of walking, cycling and public transportation	Health	Design of continuous road network
			Environment	
3	Create mixed land use	Reducing dependence on the car	Transportation	Mixing of uses to create vitality and dynamism
		Economic development and housing price balancing	Vitality	Compliance with the principle of compatibility and contiguity of uses
		Inducing a sense of social participation to residents	Economic	
		Creating diversity and improving the quality of the environment	social	
			Environment	
4	Create different types of housing	Helping the positive interaction of society	social	Building a wide range of different types of housing at different prices
			operational	Compliance with the principle of diversity in the architecture of buildings
			Housing	
			Economic	
5	Increased density	Savings from aggregation	Economic	Increasing the building density according to the appearance and urban landscape
		Prevent horizontal growth	physical	Renovation and improvement of residential structures
		Optimal use of land in the city		
6	Preservation and strengthening of traditional structures	Improving the quality of the neighborhood	physical	Determination of specific edges
		Protecting the identity and personality of the neighborhood	operational	Neighborhood-oriented design
		Create legibility and mental image		Designing the neighborhood center based on traditional and cultural principles and values
7	Attention to buildings with historical value	Preserving and strengthening the identity of the neighborhood	cultural	Identifying and preserving buildings of historical value
				Coherence and integration of body elements

title	The principle of neo-traditionalism	Property	Quality of life indicators	Procedure
				Nature-oriented and eco-oriented design
8	Using resident participation	Ensuring the realization of the plan	social	Using residents' opinions in the planning stages and creating social trust
		Creating social capital		
9	Preservation of public open spaces	Providing beauty and balance in neighborhoods	Beauty	Creating public open space and green space 15 minutes away from the center of the neighborhood and creating collective and social spaces
			Environment	
			Health	
			social	
10	Strengthening public transportation	Reducing dependence on the car	Environment	Location of major activity centers within 15 minutes
		Reduce traffic congestion	Health	
		Reducing energy consumption	Transportation	
11	Creation and management of behavioral camps	The vitality and beauty of the street scene	Vitality	Establishment of mixed uses
			Beauty	
			social	
12	Use the tool	Creating a sense of peace for the residents	peace of mind	Physical clarity for users
	Urban design in	Creating a sense of security and belonging for residents	Health	Coherent perspectives
	To increase urban security		security	
			Designing	
			sense of belonging	

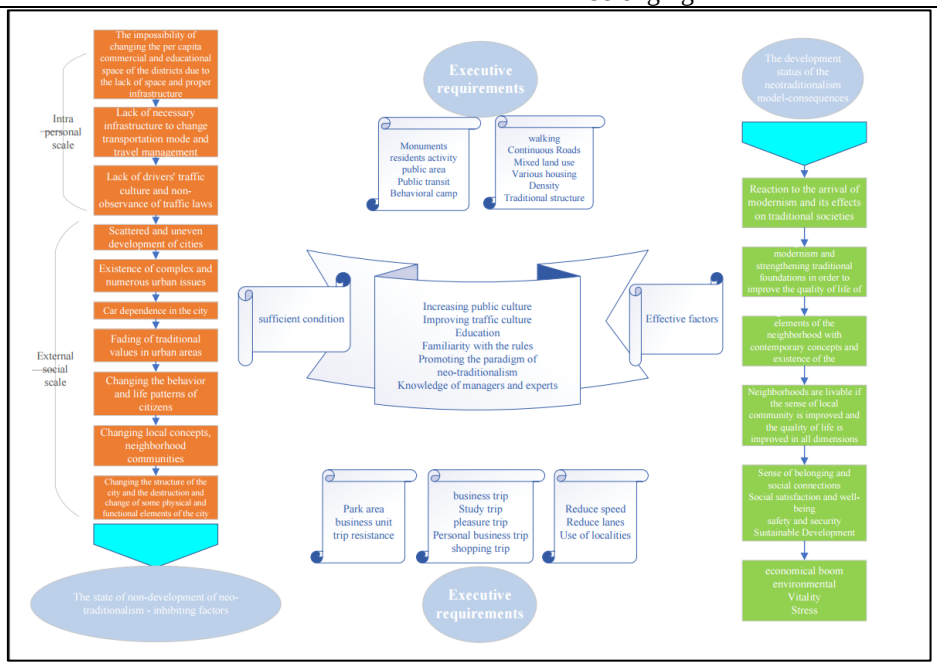

Figure 20. Neo-traditionalist model for improving urban life and transportation

5. Conclusion

Traditional areas are being revitalized and reconfigured in response to inefficiencies in infrastructure and use in new urban developments. To give city areas identity, this approach targets different human needs. Neo-traditional regions aim to achieve four general design goals: social, economic, environmental, and physical. This paper examines rural-urban neighbourhoods, also known as neo-traditional urbanism, for the Mashhad holy city case study. VISSUM software was used to measure the quantitative parameters of the four-stage transportation modelling. Following this, the sensitivity analysis of the models was conducted based on quantity indicators, such as travel time, V-Km, CO pollution emission, and fuel consumption. In neo-traditional neighbourhoods, a 40% increase in home-based trips can reduce travel time by 2.14% and 3.99% in the local network and the whole city, respectively. By eliminating traffic from neo-traditional areas, local CO emissions would be reduced by 35.36%. In order to score the quality indicators collected from past scientific texts, the Fuzzy Delphi technique was used. Results showed that all three scenarios had high reputations among elites regarding indicators of safety and discipline in urban life. Fuzzy Delphi method also rated environmental protection, sustainable development, satisfaction, and social relations as the highest quality indicators. In this paper, the neo-traditionalist development model was built using Grounded theory technique. According to an in-depth interview conducted with a wide range of relevant scientists, unbalanced city development, a lack of necessary infrastructure, and the fading of traditional values in city zones are some of the obstacles to creating neo-traditional neighbourhoods. Based on the neo-traditionalist development model, traditional areas will preserve the advantages of modernism and strengthen traditional foundations, integrate neighbourhoods, improve social sense, and boost economic prosperity. As a result, neo-traditional policies require executive actions such as creating bicycle lanes and walking paths, changing the use of cities, and improving housing density.

It is pointed out that the methods of examining quantitative and qualitative indicators and building the model of neo-traditionalism presented in this paper, despite the significant differences, do not have any contradictions in their implementation and that a comprehensive review was conducted only to master a variety of indicators.

6. Acknowledgements

Amol University's approved doctoral course thesis is the source for this article. In carrying out and improving the quality of this research, the authors would like to express their sincere gratitude to **Eng. Mohammad Mahdi Tahoorinia**, a senior expert in the field of Traffic&Transportation Engineering. Due to some university rules, this paper cannot include his name as an author.

7. References

– Arent, Randall (2007). New Urbanism Charter, translated by Alireza Danesh and Reza Basiri Mojdehi, Urban Processing and Planning Company, Tehran.

– Ajza Shokohi, Mohammad; Sabbaghi Abkooh, Shirin; Khazainejad, Forough. (Autumn 1400). Measuring the stability of the physical-spatial indicators of the Rah Ahan and Rezashahr neighborhoods of Mashhad with the new Neo-traditionalism approach. Applied Research Journal of Geographical Sciences. 21st year, number 62.

– Bagheri, Mohammad; Azamati, Hamidreza. (2009). Improving the physical and mental health of citizens by designing the urban environment and landscape. Man, and environment Magazine.

– Barati, Naser; Sardara, Ali Akbar. (2012). The effect of urban indicators on private car use and energy consumption in the Tehran. Scientific Research Quarterly of Nazar Research Center for Architecture and Urban Planning.

– Habibzadeh Maleki, Ashab; Jangi, Mohammad Hossein. (Autumn 2015). Investigating the influencing factors on the citizen's private cars tendency to use in trips. Rahvar Research Studies Quarterly, 5th Year - No 18.

– Ramzanzadeh, Saeed; Shakibaifar, Davood. (Winter 1401). The impact of smart transportation on the development of urban sustainability. Rahvar Scientific Quarterly, Year 11-No 43.

– Ebadinia, Fahima; Ajza Shokohi, Mohammad; Rahnama, Mohammad Rahim; Kharazmi, Omid Ali. (Autumn 2016). Investigating the impact of land use intensity on the environmental sustainability of transportation in Mashhad. Geographical studies of arid regions, 8th period, 29th issue.

– Azizi, Hamidreza; Sadat Hosseini, Seyyed Mohammad; Ahadi, Mohammadreza; Kashfi, Seyed Saeed. (2016). Factor analysis of pedestrian safety in urban roads (case study: Tehran, 2015). Rahvar Research Studies Quarterly, 6th Year - No 23.

– Transportation Research Center of Technology Sharif University. (2003). Trip production and attraction models. Mashhad comprehensive transport studies. Report No. 02-76, Mashhad Transport and Traffic Organization.

– Ayyoob Sharifi. (2016). From Garden City to Eco-urbanism: The quest for sustainable neighborhood development. Sustainable Cities and Society, 20, 1-16.

– Barton, Aschman Associates Inc. (February 1997). Model Validation and Reasonableness Checking Manual. Book, Cambridge Systematics, Inc., FHWA.

– Dimitris Milakis., Robert Cervero., Bert van Wee. (2015). Stay local or go regional? Urban form effects on vehicle use at different spatial scales: A theoretical concept and its application to the San Francisco Bay Area. The Journal of Transport and Land Use http://jtlu.org, Vol. 8 No. 2 pp. 59–86.

– Dionysia Lambiri, Bianca Biagi., Vicnete Royuela. (October 2007). Quality Of Life in the Economic and Urban Economic Literature. Social Indicators Research, Vol. 84, No. 1, pp. 1-25 (25 pages).

– E Diener., R Biswas-Diener. (2011). Happiness: Unlocking the mysteries of psychological wealth. books.google.com.

– Eduardo A. Lora., Andrew Powell. (2011). A New Way of Monitoring the Quality of Urban Life. Inter-American Development Bank.

– Harvey, G. (July 1993). A Manual of Regional Transportation Modeling Practice for Air Quality Analysis for. Natural Association of Regional Councils, Washington, D.C.

– Hensher, D.A. (1986). Sequential and full information maximum likelihood estimation of a nested logit model. Review of Economics and Statistics, 68(4).

– JL Grant., S Tsenkova. (2012). New Urbanism and Smart Growth Movements. Doi:10.1016/B978-0-08-047163-1.00494-X

– Joe Verdoom. (2012). Unintended Consequences Of The Neo-Traditional City Planning Model. New Geography Magazine.

– J. Tack, A. Becher, C. Mulligan, D. A. Johnson. (2012). Systematic review: the burden of disruptive gastro-esophageal reflux disease on health-related quality of life. First published. doi.org/10.1111/j.1365-2036.05086. x.

– Kanafani, A. (1983). Transportation demand Analysis. McGraw-Hill Book Company, New York.

– Kostas Mouratidis. (October 2020). Commute satisfaction, neighborhood satisfaction, and housing satisfaction as predictors of subjective well-being and indicators of urban livability. Travel Behavior and Society, Volume 21, Pages 265-278.

– McCann, Eugene j. (15 May 2013). Neotraditional Developments: The Anatomy of a New Urban Form. Department of Geography, University of Kentucky, Lexington, Kentucky 40506, published online.

– Michael, Aaron Berman. (May 1996). The Transportation Effects of Neo-Traditional Development. Journal of Planning Literature, Volume. 10, No. 4.

– Ortuzar, J. de D. and L.G. Willumsen (2001). Modeling Transport. John Wiley & Sons, New York, USA.

– Ortuzar, J.D.D., Willumsen, L.G. (2001). Modeling Transport. John Wiley & Sons, Ltd, 3rd Edition.

– Pedersen, N. J., Samdahl, D. R., (December 1982). Highway Traffic Data for Urbanized Area Project Planning and Design (NCHRP Report 255). Transportation Research Board, National Research Council, Washington, D.C.

– Sapena, M., Wurm, M., Taubenböck, H., Tuia, D., & Ruiz, L. A. (2021). Estimating quality of life dimensions from urban spatial pattern metrics. Computers, Environment and Urban Systems, 85, 101549.

– Svetlana Zakharovaa., Sergey Yashina, Larysa Ziankovab. (2022). Creating a safe transportation system as a strategic goal to improve the quality of life. Transportation Research Procedia, 63 2370–2377.

– Tanweer Hasan., Ishtiaque Ahmad., Md. Hadiuuzaman. (2014). Neo traditional Neighborhood Design: Transit and Walking Friendly Land Development Approach. Journal of Transport System Engineering 1: 1, 46-54.

– Tan Yigitcanlar., Kushairi Rashid., Fatih Dur. (2010). Sustainable Urban and Transport Development for Transportation Disadvantaged: A Review. The Open Transportation Journal, 4, 1-8.

– VISSUM 11, Fundamentals (User Manual).

– Xiongbing Jin., Roger White. (2012). an agent-based model of the influence of neighborhood design on daily trip patterns. Computers, Environment and Urban Systems, 36, 398-411.

– Zohreh Asadi-Shekari., Mehdi Moeinaddini., Muhammad Zaly Shah. (April 2015). Pedestrian safety index for evaluating street facilities in urban areas. Safety Science, Volume 74, Pages 1-14.