REDEFINING PLACE FOR WALKING: A LITERATURE REVIEW AND KEY-ELEMENTS CONCEPTION

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Abstract

Walking is the very basic method of urban mobility. It was the most reliable method of commuting for the citizen until the phenomenon of urban sprawl arrived. The technology development on motorised vehicle has since then successfully replaced walking amongst the citizen. However it also generated worldwide environmental issues. Therefore many studies had already been conducted to acknowledge and re-introduce the contribution of walking in sustainable urban development. For this study, authors conducted extensive literature review of 45 scientific research papers. As a result, authors identified 3 (three) key-elements and introduced them as PLACE: Profile, Activity, and Environment, of the pedestrian. The Pedestrian Profile is defined as a combination of the following key-attributes: age; financial income; physical condition; gender; mobility choice; employment and education background; social cultural capital; pedestrian type; and public transportation usage. The Pedestrian Activity is defined by the key-attributes as follow: walking-related purposes; social interaction; walking intensity; walking habits; and transport modes interaction. Then the Pedestrian Environment is defined by the key-attributes of: spatial planning features; walk-ability; neighbourhood liveability; traffic safety; pedestrian facilities (hard elements); pedestrian facilities (soft elements); and environmental quality. Based on this, authors suggest that those key-elements and their key-attributes need to be carefully addressed in the planning process of a walk-able urban environment.

Keywords: walking; pedestrian; key-elements; key-attributes; PLACE.

1. INTRODUCTION

Walking is the very basic transportation mode for people especially in an urban environment. All users of the other transportation modes either motorised or non-motorised, must walk at some point of their journeys. For example, we walk either to go to a public transportation station or from a garage or parking lot to a building entrance. Walking is always occurred either at the beginning, in between, or at the end of every mode of transportation.

Since the early periods of urban generation, walking had become the most reliable method of commuting for the citizen until the phenomenon of urban sprawl arrived. The technology development on vehicle, mostly motorised, has since then reduced the popularity of walking amongst the citizen. However it also generated worldwide environmental issues which are carbon emission and fossils fuels exploitation. Despite of that the development of motorised vehicle-based transportation is still unstoppable. It has out-scaled the demand and the need of walking-based urban mobility. Moreover it has became a direct threat to the walking practitioners. In the United States during 2004, more than 10% of traffic deaths nationwide were of the pedestrians (Shay, Spoon, & Khattak, 2003). Therefore many multidisciplinary studies had already been conducted to acknowledge and re-introduce the contribution of walking to sustainable urban development.

Those studies may have resulted positive changes directly or indirectly towards walking-friendly development. Nowadays in the United States, daily walking has been encouraged for the citizens within campaigns of public health (Staunton, Hubsmith, & Kallins, 2003). Furthermore, a study in Tokyo, Japan concluded that the longevity of senior citizens is surely influenced by walk-able green spaces (Takano, Nakamura, & Watanabe, 2002). Meanwhile in New Zealand, it is the second most popular transportation mode until the present days (Land Transport New Zealand, 2007).

A study has concluded that by improving walking condition and environment, we can avoid traffic congestion, conserve the nature, increase public health and the living quality in our city (Blanco et al., 2009). Another study also found that there are several attributes that influence pedestrian such as social environment, sidewalk facilities and activities, building appearances, and personal safety (Brown, Werner, Amburgey, & Szalay, 2007). Walking environment is very important because pedestrians move slower than motorised vehicle thus they interact more to their surroundings (Sauter, Hogertz, Tight, Thomas, & Zaidel, 2010). Average Japanese walk with the speed ranging from 81 to 93.6 meters per minute (Mateo-Babiano & Ieda, 2007). With this speed, pedestrians are allowed to be influenced by their walking environment. However walking condition seems to be defined by various elements. These elements need to be clearly defined and understood first in order to improve walking condition.

2. RESEARCH OBJECTIVE

Studies on walking phenomenon are vastly ranging from the field of urban planning, transportation, environmental sciences, human behaviour, general health, and so on. This shows how big the contribution of walking is in people's life especially in urban context. The methods of previous studies were also covered from either quantitative or qualitative approach. Both approaches had provided

significant results of their own, resulting numbers of different key elements and parameters in walking. Yet it was still rather difficult to define a consensus of common attributes in the study of walking.

3. METHOD

Therefore in the purpose of acquiring a comprehensive understanding of walking as an urban activity, authors conducted extensive literature reviews of scientific journals and papers. A total of 45 manuscripts was collected and categorised by its methods. Then further content analysis was conducted to extract all keywords, generate groups of key-elements from the keywords, extract important parameters or factors as key-attributes, and later to synthesise common key-attributes in the study of walking. At the end it aims to propose a tool for planning and for assessment as well.
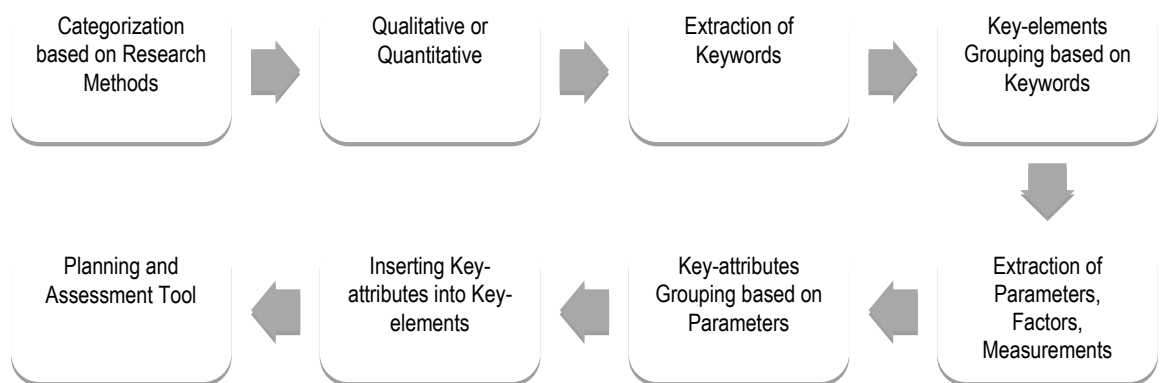

FIGURE 1 - RESEARCH METHOD DIAGRAM

3.1. Collection and categorisation

To begin the data collection, at first a keyword of "pedestrian" was typed into a search engine to select a startup online manuscript. Then authors went through to the reference part of this startup manuscript and then tried to find and collect all relevant and accessible papers that were being cited, using the internet as well. This collection method was repeated for each manuscript until it had reached 45 manuscripts for review.

Although this process was rather randomly conducted, authors used several considerations in order to select the manuscripts such as that they should be scientifically indexed publication, published in international journals with impact factors and also within recent years, used as a main reference for national or state regulation or law, and/or parts or chapters from registered publication such as books with ISBN (International Standard Book Number) and/or on-going research or project reports from scientific institute.

And then initial categorisation based on the manuscript's method of data collection was conducted to identify the most common methods in the study of walking phenomenon. There are various methods that can be grouped mainly as qualitative method which are: direct and video observation or audit; literature review; documentation using verbal, diagram, and photograph tools; writing activity; travel diary; and interview either directly or by phone. Please refer to Table 1 below.

TABLE 1 - QUALITATIVE METHODS

Methods	References
observation	Azmi (2012), Hanan (2012), Kwon (1997), Wang (2014), Helbing (2001), Naderi (2005), Sisiopiku (2003), Cho (2009)
literature review	Cubukcu (2013), Galderisi (2010), Shay (2003), Helbing (2001), Owen (2004), Tudor-locke (2004), Ehrenfeucht (2007)
documentation	Hanan (2012)
writing	Shokoohi (2012)
interview	Kelly (2011), Shokoohi (2012), Naderi (2005), Tajima (2013), Tsukaguchi (2011), Addy (2004), Besser (2005), King (2003)
travel diary	Cervero (1997), Forsyth (2009), Krizek (2006), Besser (2005)

And then there are others which were quantitative methods such as: field and mailed questionnaire or survey; rating or score or index; GIS and aerial photograph; simulation software and experiment; land use and regional inventory; and pedometer or measurement. Please refer to the following Table 2.

TABLE 2 - QUANTITATIVE METHODS

Methods	References
questionnaire	Ariffin (2013), Azmi (2012), Foltete (2007), Maghelal (2011), Tsukaguchi (2010), Manaugh (2011), Shokoohi (2012), Naderi (2005), Lindelöw (2014), Leyden (2013), Sisiopiku (2003), Cervero (1997), Cho (2009), Forsyth (2009), Tajima (2013), Krizek (2006), Tsukaguchi (2011), Gebel (2011), Sugiyama (2008), Owen (2007), Li (2005), Foster (2004), Dawson (2007), Tsubono (2002)
rating/score	Parks (2006), Azmi (2012), Greenwald (2001), Lwin (2011), Leslie (2007),
GIS/aerial photographs	Parks (2006), Lwin (2011), Leslie (2005), Leslie (2007), Cho (2009), Forsyth (2009), Owen (2007), Li (2005)
simulation	Maghelal (2011), Wang (2014), Xi (2012), Brown (2007)
inventory	Cervero (1997)
pedometer	Forsyth (2009), King (2003), Tudor-locke (2004), Tsubono (2002)

3.2. Content Analysis

Following the categorisation of data collection method, a content analysis with quantitative approach was conducted by documenting, counting, and grouping all keywords from the manuscripts based on the terminology. The keywords are cited and preserved as its original version in the manuscripts. Generally each manuscript has 5 to 6 keywords. And then the keywords were ordered based on their number of appearances within all manuscripts and also grouped based on their similarities in the context and meaning. Some of the referenced manuscripts do not define their keywords therefore they were considered as "not available" and were not counted. Please refer to Table 3 for the documentation of all keywords in alphabetical order of the Author's name.

TABLE 3 - KEYWORDS

References	Keywords
Addy (2004)	fitness walking; human locomotion; physical education; physical fitness; walking; United States
Ariffin (2013)	walkability; sustainable transport; perceptions; pedestrian
Azmi (2012)	community facilities; neighbourhood area; walkability; walking behaviour
Besser (2005)	(not available)
Brown (2007)	environmental aesthetics; incivilities; urban environment; walking
Cervero (1997)	built environment; demand; density; travel behavior; travel demand
Cho (2009)	actual crash risk; built environment; pedestrian safety; perceived crash risk
Cubukcu (2013)	walkability; walkable communities; active living
Dawson (2007)	cross-sectional survey; health problems; METs
Ehrenfeucht (2007)	public space; sidewalks; Los Angeles; United States; municipal government; regulation
Foltete (2007)	accessibility; landscape preference; movement; space syntax
Forsyth (2009)	built environment; neighborhood; physical activity; walking
Foster (2004)	(not available)
Galderisi (2010)	pedestrian networks; soft mobility; urban sustainability
Gebel (2011)	body weight changes; environment; Geographic Information Systems; neighborhood; physical activity; prospective studies
Greenwald (2001)	neo-traditional design; pedestrian traffic; transit-oriented development; walking trips
Hanan (2012)	Bandung; pedestrian ways; small-scale entrepreuner; urban spectacle
Helbing (2001)	(not available)

Kelly (2011)	built environment; pedestrians; stated preference; mobile methods
King (2003)	environment; pedometer; physical activity; prevention research; women
Krizek (2006)	(not available)
Kwon (1997)	(not available)
Leslie (2005)	built environment; environmental perceptions; walking; public health
Leslie (2007)	built environment; environment and public health; Geographic information Systems; physical activity; walkability
Leyden (2013)	(not available)
Li (2005)	(not available)
Lindelow (2014)	built environment; every-day activities; Sweden; walkability; walking
Lwin (2011)	eco-friendly walk score calculator; neighbourhood environmental quality; shortest or greenest route; assessment; Advanced Land Observing Satellite (ALOS)
Maghelal (2011)	(not available)
Manaugh (2011)	walkability; equity; neighbourhood; school; shopping
Naderi (2005)	artificial intelligence; multi-disciplinary design analysis; pedestrian landscapes; user evaluation; walking for health
Owen (2004)	(not available)
Owen (2007)	(not available)
Parks (2006)	aerial photography; GIS; pedestrian environment; pedestrian friendliness; walkability
Shay (2003)	walking; pedestrian; physical environment; planning; safety
Shokoohi (2012)	neighbourhood; school; social barriers; walking to and from
Sisiopiku (2003)	crossing compliance; crosswalks; midblock crosswalks; pedestrian compliance; pedestrian perceptions; pedestrians; signalized crosswalks; user survey
Sugiyama (2008)	(not available)
Tajima (2013)	lifestyle; pedestrian attitudes; pedestrian behavior; pedestrian survey; public transport
Tsubono (2002)	physical activity; questionnaire; reproducibility; validity; walking
Tsukaguchi (2010)	attitudes of pedestrians; EASTS IRG05; image of walking; pedestrian travel culture
Tsukaguchi (2011)	EASTS IRG05; attitudes of pedestrians; lifestyle issues; pedestrian travel culture; statistical comparison
Tudor-locke (2004)	(not available)
Wang (2014)	pedestrian movement behavior; microscopic modeling; visual attractors; impulse stops
Xi (2012)	hierarchical model; cellular automata; pedestrian decision making; Extended Decision Field Theory; urban traffic modelling

Content analysis was then continued by extracting research key attributes from the discussion and result part of the manuscripts. The key-attributes could be the parameters, factors, measurements or others that were discussed or concluded as results of those manuscripts. For example in the conclusion part, Arifin (2013) wrote:

"This paper presents the findings of a study combining walkability audits and a survey-based respondent to examine the influence of built environment characteristics, on people perceptions of urban walking environment. Findings indicate that the proximity of destinations, good weather condition, safety and well-designed pedestrian facilities can significantly contribute to better perceptions of the walking environment. In planning a walkable city to promote sustainable transport in the Klang Valley, planners should look into a plan that promotes crime prevention and safety, density that would encourage people to walk to activities and man-made or natural environment that provide ease of walking."

Authors acknowledged the factors written in bold above which are: the proximity of destinations (distance); good weather condition (weather); safety; well-designed pedestrian facilities (design), as the key-attributes of this manuscript. The same procedures were conducted towards other manuscripts to collect the key-attributes. Please refer to Table 4.

TABLE 4 - RESEARCH KEY-ATTRIBUTES

References	Key-attributes
Addy (2004)	demographic characteristics; social and physical environmental perceptions; physical activity and walking behavior; sidewalks; public recreation facilities, streetlights; pleasant neighborhood for walking; physically active neighbor
Ariffin (2013)	distance; weather; safety, design
Azmi (2012)	distance; catchment area radius; location, accessibility; density; land use pattern
Besser (2005)	age; education; race/ethnicity; household income; transit type; population density; car ownership
Brown (2007)	traffic, environmental, and social safety; pleasing aesthetics; natural features; pedestrian amenities; land use diversity; superior social milieu rating
Cervero (1997)	density; land-use diversity; pedestrian-oriented design
Cho (2009)	actual car risk; perceived car risk; low density; non mixed land use
Cubukcu (2013)	land use; traffic safety; crime safety; walking and cycling comfort; accessibility; environmental aesthetics and upkeep; social relations
Dawson (2007)	age; gender; marital status; working status; postal code; general health status; past and present smoking behavior; personal safety and the lack of anyone to walk in the neighborhood; frequency; duration; intensity of physical activities: travel to work by

	cycle or by walking; activity at work, at home, garden, others; walking or outdoor cycling for leisure; stair climbing; sports; recreation
Ehrenfeucht (2007)	sidewalks as public ways; street vending; public speaking
Foltete (2007)	built forms; visual obstacles; vegetation; empty spaces
Forsyth (2009)	travel walking; leisure walking; physical activity; height; weight
Foster (2004)	age; gender; social status; educational qualifications; self reported health status, and car ownership; frequency; duration; intensity; type of physical activity
Galderisi (2010)	pedestrian network; connection to other urban mobility network
Gebel (2011)	height; weight; age; sex; income; access to shops and services or public transport; quality of places to walk; attractiveness of neighborhood and safety from traffic and crime; dwelling density; street connectivity; land use mix; net retail area ratio; weekly minutes of walking for transport, recreation or exercise
Greenwald (2001)	density; trip distance
Hanan (2012)	visitor; trader; commercials; business activity; time of visit; socio-cultural relation; informal economic practice
Helbing (2001)	lane formation
Kelly (2011)	pavement cleanliness; safe crossing places; good connectivity; sense of security
King (2003)	convenience of destinations within walking distance of the home; perception of the quality of their neighborhood for walking
Krizek (2006)	household and individual socio- economic and demographic data; home location; retails within walking distance of home; population density of neighborhood; quality of schools; regional accessibility; origin and destination; travel mode; duration; primary activity at the destination
Kwon (1997)	pedestrian walking position; interaction with other traffic modes
Leslie (2005)	residential density; land-use mix diversity and access; street connectivity; walking facilities; aesthetics; traffic safety; safety from crime.
Leslie (2007)	dwelling density; intersection density; land use and net retail area
Leyden (2013)	level of social capital; neighbourhood design
Li (2005)	senior residents; density of places of employment; household density; green and open spaces for recreation; number of street intersections
Lindelow (2014)	age; gender; level of education; household income; feasibility (daily activity, time); accessibility; traffic; pleasurability; personal characteristic, daily travel; walking behaviour
Lwin (2011)	environmental quality of a neighbourhood; nearest facilities accessible on foot; eco-friendly place; route for green exercise
Maghelal (2011)	sidewalks (width, lack, sharing with bike, maintenance); buffers; trees
Manaugh (2011)	socio-demographic; mobility choice; non work trip
Naderi (2005)	weather; sound; water; light; edge of space

Owen (2004)	aesthetic attributes; convenience of facilities for walking; accessibility of destinations; perceptions about traffic and busy roads; exercise and recreational walking, walking to get to and from places, total walking
Owen (2007)	age; gender; individual-level socioeconomic status; reasons for neighborhood self-selection; weekly frequency of walking for transport and the objectively derived neighborhood walkability index; environmental factors and walking for recreation
Parks (2006)	sidewalk; parking lot, building setback; block length, intersection type; cencus block density
Shay (2003)	opportunity (distance; weather; topography; cost; traffic volume and speed; infrastructure) and motivation (physical condition; family circumstances; cultural; education; profession; habit; attitude; value); pedestrian facilities; accessibility and convenience; mixed land uses; connectivity; parks, plazas and open space; aesthetics; traffic calming and street safety; transit access; street orientation; residential density; neighborhood schools; Americans with Disabilities compliance
Shokoohi (2012)	family income; parental perception about personal and traffic safety; avoiding travel cost
Sisiopiku (2003)	crosswalk; physical barrier; crosswalk shelter; coloured paving; pedestrian warning sign
Sugiyama (2008)	physical and mental health scores; perceived neighbourhood greenness; walking for recreation and transport; social coherence; local social interaction and sociodemographic variables
Tajima (2013)	lifestyle (income, expenditure, employment, car ownership and driving license); regional characteristic; a composite outcome of infrastructure, individual characteristics and societal attributes
Tsubono (2002)	sex; age; average duration of walking per day
Tsukaguchi (2010)	age; car ownership; public transport usage
Tsukaguchi (2011)	gender; age; car ownership; public transport usage; distance to nearest bus stop and train station; perceived walking time to nearest bus stop; level of service of infrastructure; regional environmental factors; citizens attributes
Tudor-locke (2004)	(i) <5000 steps/ day: 'sedentary lifestyle index'; (ii) 5000–7499 steps/day: typical of daily activity excluding sports/exercise and might be considered 'low active'; (iii) 7500–9999: includes some volitional activities (and/or elevated occupational activity demands) and considered 'somewhat active'; and (iv) ≥10 000 steps/day: 'active'; >12 500 steps/day: 'highly active'
Wang (2014)	attractor's attractiveness, distance, and visibility
Xi (2012)	pedestrian type; destination; group behaviour; traffic light; waiting at the crosswalk

4. RESULTS AND DESIGN POTENTIAL

4.1. Data Collection Methods

The categorisation of the method of data collection showed that there are 46 practices of quantitative method compared to 29 practices of qualitative method. From this result, authors acknowledged that

quantitative methods were used more than qualitative methods, especially questionnaire for data collection. Meanwhile amongst the qualitative methods, observation and interview were the most common methods for data collection. Therefore for further research, authors would utilise questionnaire for quantitative method combined with observation and/or interview for qualitative method. Please refer to Figure 2.
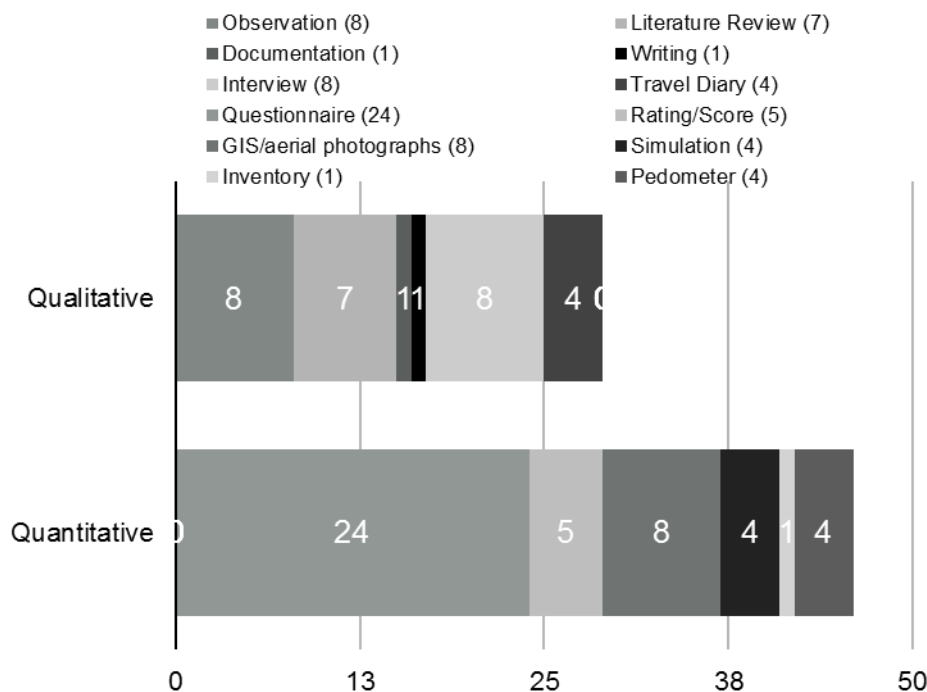
FIGURE 2 - QUALITATIVE OR QUANTITATIVE METHODS

4.2. Key-elements Grouping based on Keywords

Authors then proceeded with the keywords. After documenting all keywords of the referenced manuscripts, authors analysed and ranked them by number of appearances. There are in total 111 keywords with many of them were repeated from one manuscript to another, have similar meaning and terminology, or are related to each other. The word "walking" has been mentioned the most (8 times) within several manuscripts, followed by "walk-ability" (7 times), "built environment" (7 times), "physical activity" (5 times), "pedestrian" (4 times), "pedestrian attitudes" (3 times), "Geographic Information System" (3), and other keywords which are only mentioned once or twice.

However since many of them are also related to each other, authors proposed to group the keywords. For example, since the term "walk-ability" is referred as a scale to assess how suitable a certain area for walking activity (Ariffin & Zahari, 2013), thus authors found the relation with the term of "built environment" which also defines a physical area. Another study also suggested that "walk-ability" is

often studied as certain physical features in the built environment (Lindelöw, Svensson, Sternudd, & Johansson, 2014). Therefore authors suggested both terms to be included in the group of "Pedestrian Environment".

TABLE 5 - MAIN KEYWORDS

Key-elements	Main Keywords (Nr. of Appearances)	Related Keywords (Nr. of Appearances)
Pedestrian Activity	walking (8)	fitnes walking (1); walking trips (1); walking for health (1); sustainable transport (1); soft mobility (1); image of walking (1)
	pedestrian attitudes (3)	perceptions (1); walking behaviour (1); incivilities (1); travel behavior (1); pedestrian safety (1); movement (1); stated preference (1); shopping (1); crossing compliance (1); pedestrian compliance (1); pedestrian perceptions (1); pedestrian behavior (1); pedestrian travel culture (1); pedestrian movement behavior (1); impulse stops (1); pedestrian decision making (1)
Pedestrian Environment	walkability (7)	walkable communities (1); pedestrian friendliness (1); shortest or greenest route (1); eco-friendly walk score calculator (1); accessibility (1); safety (1)
	built environment (7)	neighbourhood area (1); environment (1); community facilities (1); environmental aesthetics (1); urban environment (1); public space (1); sidewalks (1); landscape preference (1); pedestrian networks (1); pedestrian ways (1); neighbourhood environmental quality (1); pedestrian landscapes (1); environmental perceptions (1); pedestrian environment (1); physical environment (1); visual attractors (1); density (1); crosswalks (1); midblock crosswalks (1); signalized crosswalks (1)
Pedestrian Profile	pedestrian (4)	lifestyle (1); human locomotion (1); active living (1); health problems (1); body weight changes (1); women (1);
	physical activity (5)	physical fitness (1); physical education (1); every-day activities (1)
Research Methods and Theories	(no significant keywords)	Geographic Information Systems (3); prospective studies (1); space syntax (1); Advanced Land Observing Satellite (ALOS) (1); Extended Decision Field Theory (1); cross-sectional survey (1); mobile methods (1); pedometer (1); prevention research (1); assessment (1); multi-disciplinary design analysis (1); user evaluation (1); aerial photography (1); user survey (1); pedestrian survey (1); questionnaire (1); microscopic modeling (1); hierarchical model (1); urban traffic modelling (1)
Others	(no significant keywords)	United States (2); school (2); EASTS IRG05 (2); transit-oriented development (1); METs (1); Los Angeles (1); Bandung (1); Sweden (1); demand (1); travel demand (1); actual crash risk (1); perceived crash risk (1); municipal government (1); regulation (1); urban sustainability (1); neo-traditional design (1); small-scale entrepreuner (1); urban spectacle (1); public health (1); Sweden (1); equity (1); artificial intelligence (1); planning (1); social barriers (1); public transport (1); reproducibility (1); vailidity (1); cellular automata (1)

Meanwhile on the other hand the term of "walking" is generally referred as the sole activity of a pedestrian, although this is not entirely correct. Yet this walking activity itself also has many variations since every single pedestrian will have different behaviours and attitudes (Azmi & Karim, 2012). Therefore the term "pedestrian attitudes" is closely related to the term "walking", thus authors concluded both terms to be considered under the same group which is of "Pedestrian Activity". Then the group of "Pedestrian Profile" consists of the term "pedestrian" and "physical activity". Authors proposed this group to understand the profile of the subject of walking which is the pedestrian. Beside the three groups, there are other keywords that are not related to the content rather only to the methods and theories or even do not related to walking. These keywords would not be included in further content analysis.

From this process, authors then concluded that the keyword groups could be considered as the key-elements in study about walking phenomenon. Therefore there are three main key-elements which are: pedestrian profile, pedestrian activity, and pedestrian environment. Authors introduced an abbreviation of "PLACE" which stands for the words of "ProfiLe", "ACtivity", and "Environment" for further reference of these key-elements. Further this, authors would then continue to explore these key-elements of PLACE to gather and generate common attributes of walking from the content of the referenced manuscripts.

4.3. Finding Common Key-attributes

Authors continued further content analysis by extracting research key-attributes from the manuscripts. The key-attributes are various parameters, factors, or measurements which were being discussed, elaborated, and studied within each referenced manuscripts. As previously mentioned, these key-attributes mostly were taken from the discussion, result, or conclusion part of the manuscripts. The key-attributes were also analysed and related attributes were categorised based on the elements of "PLACE": pedestrian profile, activity, and environment.

"Age" was founded to be the most common key-attributes in defining the Pedestrian Profile. Then in the following, there is a group of several key-attributes which are related to the subject of "financial income", such as family income; household income; household and individual socio-economic; expenditure; family circumstances; and cost. Furthermore authors continued to extract the following groups of key-attributes which are mentioned in the order of the number of containing manuscripts as follow: physical condition; gender; mobility choice; employment and education background; social cultural capital; pedestrian type; and public transport usage.

As for the key-element of Pedestrian Activity, authors found that a group of key-attributes related to the subject of "walking-related purposes" was discussed the most within the referenced manuscripts. Other groups in the order of number of containing manuscripts are as follow: social interaction; walking intensity; walking habits; and transport modes interaction.

And key-element of the Pedestrian Environment covered key-attributes groups as follow: spatial planning features; walk-ability; neighbourhood liveability; traffic safety; pedestrian facilities (hard elements); pedestrian facilities (soft elements); and environmental quality. There are other key-attributes which authors did not consider since they were discussed only within one single referenced manuscript thus they do not represent common attributes. Authors preserved attributes which were from the same manuscript therefore there are several key-attributes which are double-referenced in more than one category.

5. FUTURE IMPLEMENTATION

By contextually defining and/or re-defining the PLACE, profile-activity-environment, using their common key-attributes, authors suggested that an urban area could be assessed for its existing performances and/or be improved based on its potentials to become a walk-able area. Therefore in further research, authors would assess the utilisation of the PLACE and its key-attributes within a survey questionnaire. This method is selected based on the finding that this is the most common method for data collection in the study of walking phenomenon. The questionnaire would be designed to target different kind of respondents and case study areas so then the result could be representing different scenarios for the validation process.

Authors aim that in future urban planning process, the PLACE could be emphasised as the framework for planning targets while the common attributes could become the planning parameters. In the post-occupancy evaluation process, authors would also suggest to value the PLACE and utilise its attributes for detail measurements.

6. CONCLUSIONS

From this study, authors concluded from various previous studies that in order to discuss and elaborate the walking phenomenon, there are key-elements of Pedestrian Profile, Pedestrian Activity, and Pedestrian Environment which are being introduced by authors as its abbreviation, PLACE. These key-elements were originally based on categorisation of keywords of 45 referenced manuscripts.

Furthermore each key-element will be defined by the common key-attributes which were also extracted from the referenced manuscripts.
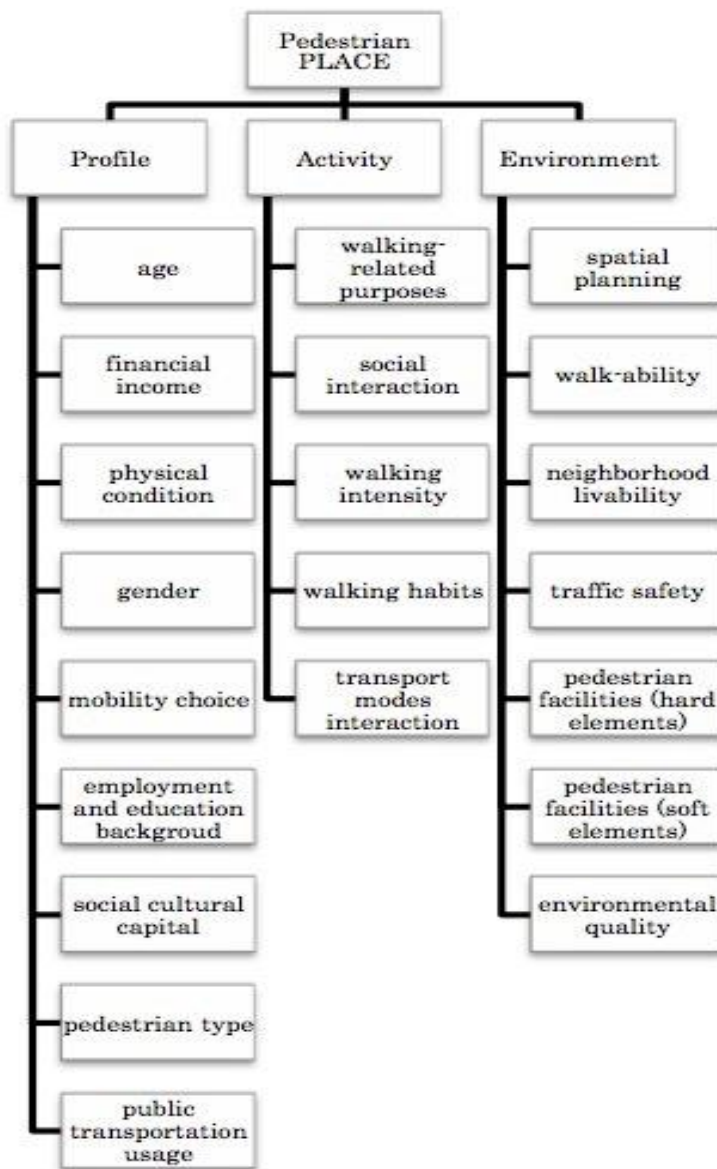

FIGURE 3 - PLACE'S KEY-ATTRIBUTES

Authors proposed that the key-element of Pedestrian Profile could be defined by investigating key-attributes as follow: age; financial income; physical condition; gender; mobility choice; employment and education background; social cultural capital; pedestrian type; and public transportation usage. Authors further proposed that the key-element of Pedestrian Activity could be defined by investigating key-attributes as follow: walking-related purposes; social interaction; walking intensity; walking habits; and transport modes interaction. The last but not the least important is the key element of Pedestrian

Environment of which could be defined from several key-attributes as follow: spatial planning features; walk-ability; neighbourhood liveability; traffic safety; pedestrian facilities (hard elements); pedestrian facilities (soft elements); and environmental quality. Naturally these key-attributes are interrelated to each other thus the key-elements could not be entirely independent as well. Therefore authors would also assume that the utilisation of the PLACE on assessment or planning process would also require adaptation to the context.

7. ACKNOWLEDGMENTS

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