A study of five dimensions evaluation model on public university sidewalks in Lampung, Indonesia

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Abstract

A university campus is an area that offers various functions that support student activities. Campus sidewalks are spaces that connect students from one function to another. The existence of sidewalks is important in accommodating student activities in a campus environment. However, between the regulations and conditions of campus sidewalks is a gap. Thus, evaluating campus sidewalks should be a priority to improve their quality.

This study aims to identify an evaluation model of campus sidewalks that is suitable to students' characteristics at a public university, to determine the correlation characteristics between student profiles and activities at the public universities in Lampung, to understand the importance of students' perception toward campus sidewalks, and to assess the level of student satisfaction and the factors that influence campus sidewalks.

The selected study cases are the three largest public campuses in Lampung Province, namely, the University of Lampung (hereinafter UNILA), State Islamic University of Raden Intan Lampung (hereinafter referred to as UINRIL), and State Polytechnic of Lampung (hereinafter referred to as POLINELA). The combined method is used sequentially (i.e., qualitative and quantitative). Thus, the method of collecting and analyzing the data is adjusted in the order.

First, this study found a model of evaluation that consists of five dimensions: quality, design, safety, sensory, and amenities. Second, this study found that the transportation mode profile affects student activities. In the case of a public campus, "safe from accidents" is the dominant variable that is the most widely perceived differently by the student activities. Third, this study found 14 dominant variables that the students consider important. "Safe from accidents" is the dominant variable that is most frequently perceived differently on account of the duration of daily activities, the return frequency after 7:00 p.m., and the frequency of walking.

Fourth, this study found six variables that did not significantly satisfy the students, namely, periodic maintenance, completeness of supporting tools for people with disability, the width of sidewalks, safety from traffic accidents, adequacy of lights at night, and availability of a zebra crossing. However, the variables that significantly satisfied the students are the type of material variables on the sidewalk, continuity of the sidewalk without significant elevation differences, safety from traffic accidents, visual attractiveness of the sidewalk, and availability of parking lots.

Keywords: *study, five dimensions, sidewalks, public university, Lampung*

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Chapter 1. Introduction

This chapter provides the introduction which describes the background to the research, the research questions, objectives, limits, contributions, and frameworks.

1.1 Background

Throughout students' college journey, many student activities are held on campus. These activities usually features various buildings, such as dormitories, lecture halls, university offices, student activity centers, sports venues, places of worship, canteens, and other supporting facilities. The complexity of the buildings and facilities on campus makes a campus the image of a small-scale city. This image is reflected in the similarities between building functions on campus and cities such as dormitories and residential areas, lecture halls and schools, university offices and government offices, canteens and convenience stores. In addition, between the campus and the city there are also some functions and facilities which are the same such as mosques, parks, bus stops, sports venues, and so forth.

The variety of building functions on campus stimulates a variety of student activities. Thus, students, as the dominant users, have a dynamic mobility. The most routine mobility in which they engage is to visit the bus stop, lecture hall, pray at the mosque, eat in the canteen, and return via bus stop again. Acceptable campus pedestrian ways are one of the most important factors on campus to facilitate student mobility.

Campus pedestrian ways are used in a campus environment as the primary mode for student mobility. Student mobility in a campus environment involves large crowds and a lot of activity (Asadi-Shekari, Moeinaddini, & Zaly Shah, 2014). Therefore, to achieve sustainability ideal pedestrian ways on a university campus are needed (H. Tuydes-Yaman, O. Altintasi, P. Karatas, 2014). Ideal pedestrian ways should follow the regulations.

Pedestrian ways on most campuses in Indonesia require serious attention, however, as evidenced by the gap between regulations and reality. Real conditions reveal path conditions that are not in accordance with regulations, as they exhibit issues such as structural damage, obstacles, accident hazards, broken pavement, and so on. This gap can definitely affect the convenience for students as they participate in academic and social activities (Turk, Sen, & Ozyavuz, 2015).

Studies on the evaluation of pedestrian ways have been widespread. Figure 1.1 shows the distribution of research studies on the evaluation of pedestrian ways. However, most of these studies focus solely on environments in urban centers. Meanwhile, research studies on campus environments are very rare. This study is therefore very important to enrich scientific references on the topic of campus pedestrian ways. The results of this study are expected to contribute to strategies for improving the quality of pedestrian environments and the convenience of walking, especially on Indonesian campuses.

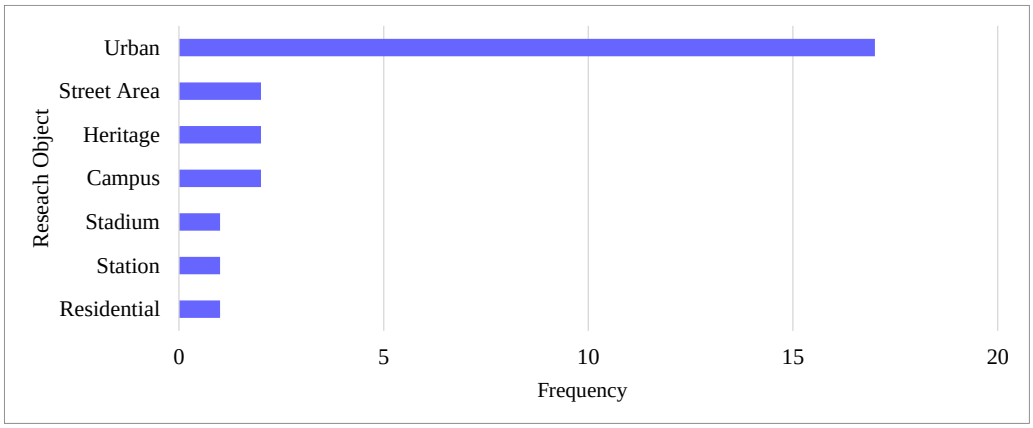


Figure 1.1 Previous research papers about pedestrian ways

The evaluation techniques used in previous studies include satisfaction evaluation, pedestrian level of service (PLOS), assessment, measurement, pedestrian index, focus group, and examination research (Figure 1.2). The satisfaction evaluation technique is the one most often used because it has several advantages. First, it involves getting feedback from users. Second, data collection is easier because respondents find it easy to understand questions about their satisfaction related to a pedestrian environment. Third, measuring results is easier using a statistical software package. Thus, the strategy for improving the quality of pedestrian environments is easier to implement using this technique.

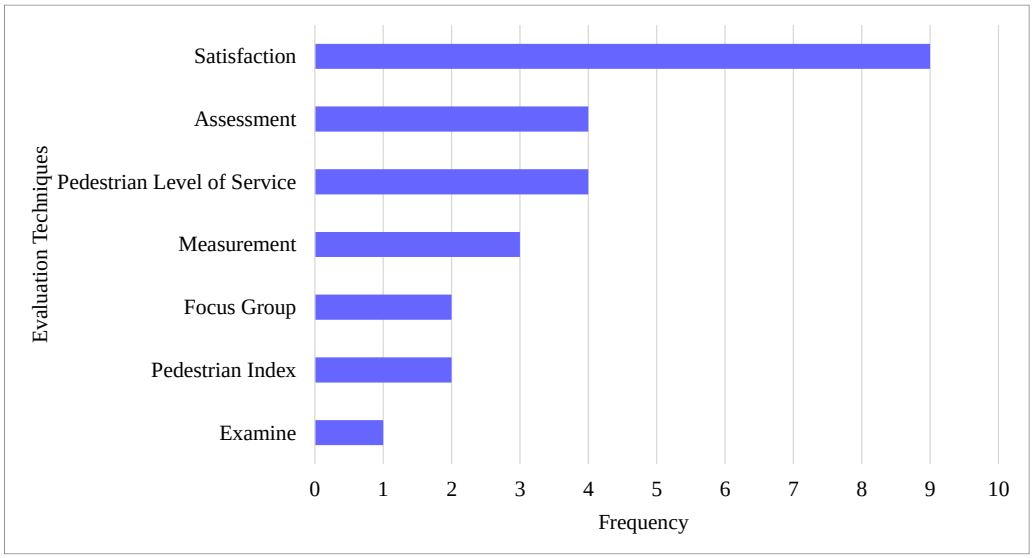


Figure 1.2 Distribution of evaluation techniques

Previous evaluation research discussed several important topics, namely, place scale, pedestrian tendency, safety, mobility, and transport connection. Place scale is the most frequently discussed of the topics. Place scale is divided into three categories: big place scale, medium place scale, and small place scale. Big scale covers the environment (Kim, Park, & Lee, 2014) and global urban centers (Nuzir & Dewancker, 2015) (Ranasinghe, et al., 2015). Medium scale includes residential areas (Luis

M. Martínez, 2014), stadiums (Florez & Muniz, 2014), and campuses (H. Tuydes-Yaman, O. Altintasi, P. Karatas, 2014) (Asadi-Shekari et al., 2014). Small scale includes street festivals (Pratiwi, Zhao, & Mi, 2015), street corridors (Erna, Antariksa, Surjono, & Amin, 2016), and green streets (Rahimiashtiani & Ujang, 2013). This research falls under the category of medium place scale because it involves campuses, and it is most suitably conducted in cities in developing countries that generally do not have satisfactory pedestrian environments. If the quality of a campus pedestrian environment is good, then cities can duplicate it in other environments.

In this research, we propose an evaluation model and test it in a pedestrian environment. The chosen environment is sidewalks at public universities in Lampung. The public universities were chosen for this study because they have the three largest campuses in Lampung Province, Sumatra Island. The universities have diverse students because they come not only from Sumatra Island but also from Java Island.

1.2 Research Question

Based on the aforementioned background information, the research questions are these:

1. What is the campus sidewalks evaluation model at the public universities in Lampung?
2. What are the characteristics and activities of student pedestrians at the public universities in Lampung?
3. What is the significance of students' views on campus sidewalks?
4. How do the level of student satisfaction and other factors influence campus sidewalks?

1.3 Research Objective

Based on the above problems, the purposes of this research are as follows:

1. To find the evaluation model of campus sidewalks which is suitable for student characteristics at the public universities in Lampung.
2. To know the correlation of characteristics between the student profiles and student activities at the public universities in Lampung
3. To understand the importance of students' perceptions of the campus sidewalks.
4. To assess the level of student satisfaction and the factors that influence the campus sidewalks.

1.4 Limitations of Research

The limitations of the study are listed below:

1. Public universities selected by criteria:
    a. The three larger of the public universities in Lampung (Figure 1.3) are University of Lampung (UNILA), State Islamic University Raden Intan Lampung (UINRIL), State of Lampung Polytechnic (POLINELA).
    b. The campus area is over 20 years old.

2. Sidewalks by criteria:
    a. focus on the physical condition of sidewalks
    b. at the main line of campus
    c. passed by motor vehicles
3. A focus on the perception of students as the dominant users on campus

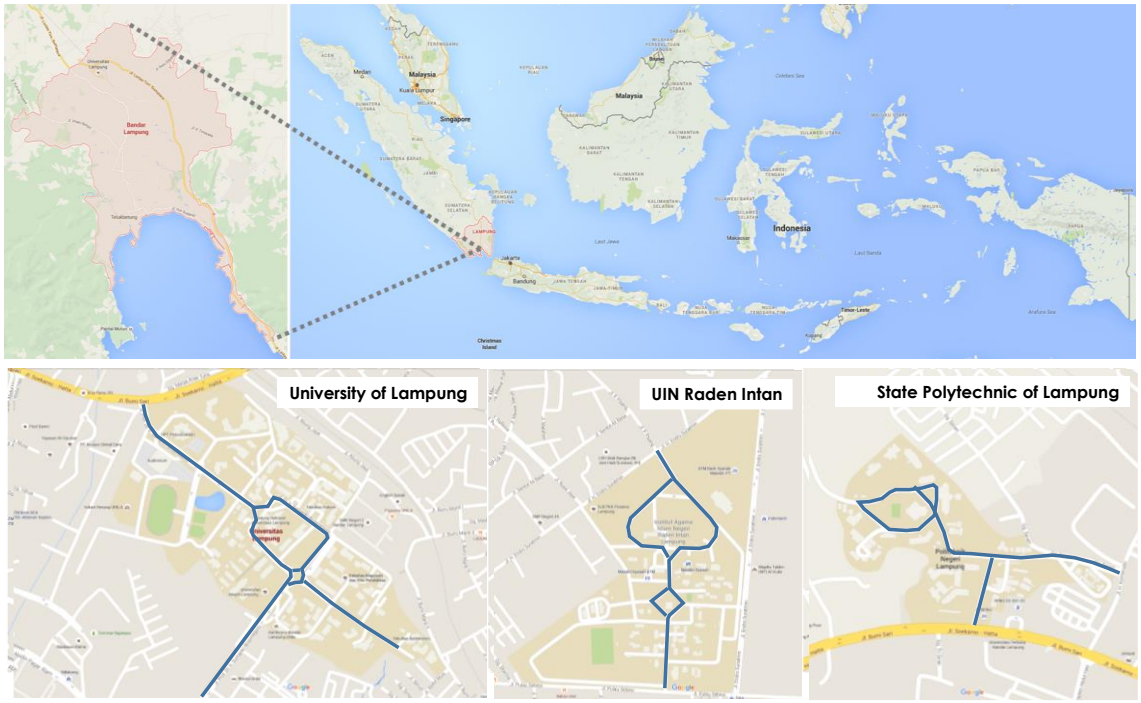


Figure 1.3 Research location

1.5 Research Contributions

The contributions of this research are that it offers:

1. An evaluation model that can be used on other public campuses.
2. Evaluation models can be developed and used for evaluation on a wider scale.
3. Evaluation methods can be implemented in improving the quality of sidewalks, especially in the campus area.

1.6 Research Structure

This dissertation consists of 8 chapters (Figure 1.4). Each chapter represents the successive stages from the introduction to the conclusion. Some chapters have been published in proceedings and international journals. The structure of this dissertation is as follows:

Chapter 1: This chapter contains the introduction which covers the background, research question, research objective, limitations of the research, the research contributions, and the research structure.

Chapter 2: This chapter contains the review of evaluations of pedestrian ways. It covers the following: introduction to pedestrian ways, previous research on the evaluation of pedestrian ways, evaluation methods for pedestrian ways, and the positioning of the evaluation of pedestrian ways.

Chapter 3: This chapter contains the methods used to achieve research objectives and includes: research stages, qualitative data collection and analysis, and quantitative data collection and analysis.

Chapter 4: This chapter contains the process of making an evaluation model including: keyword extraction from selected literature, grouping by small focus group discussion (SFGD), proposed model (five dimensions model), and the five dimensions evaluation model test (dominant factor of student satisfaction, the dominant factor of observation, comparative analysis per zone).

Chapter 5: This chapter offers an understanding of the correspondence analysis of profile and student activity on public campuses, including: the distribution of analysis of student profile, distribution of student activity, and a correspondence analysis of student profile and activity.

Chapter 6: This chapter contains the importance of the analysis of student perceptions on campus sidewalks, and includes: an introduction, the dominant factor that is considered important to students, difference in importance of level based on student profile, difference in importance of level based on student activity.

Chapter 7: This chapter contains a satisfaction analysis of student sidewalks, and includes: an introduction, the dominant factor that is considered satisfactory by students, a correlation analysis between the quarantine variable and overall satisfaction.

Chapter 8: This chapter contains the conclusions of all the results of the research discussion on chapter 4 to chapter 7.

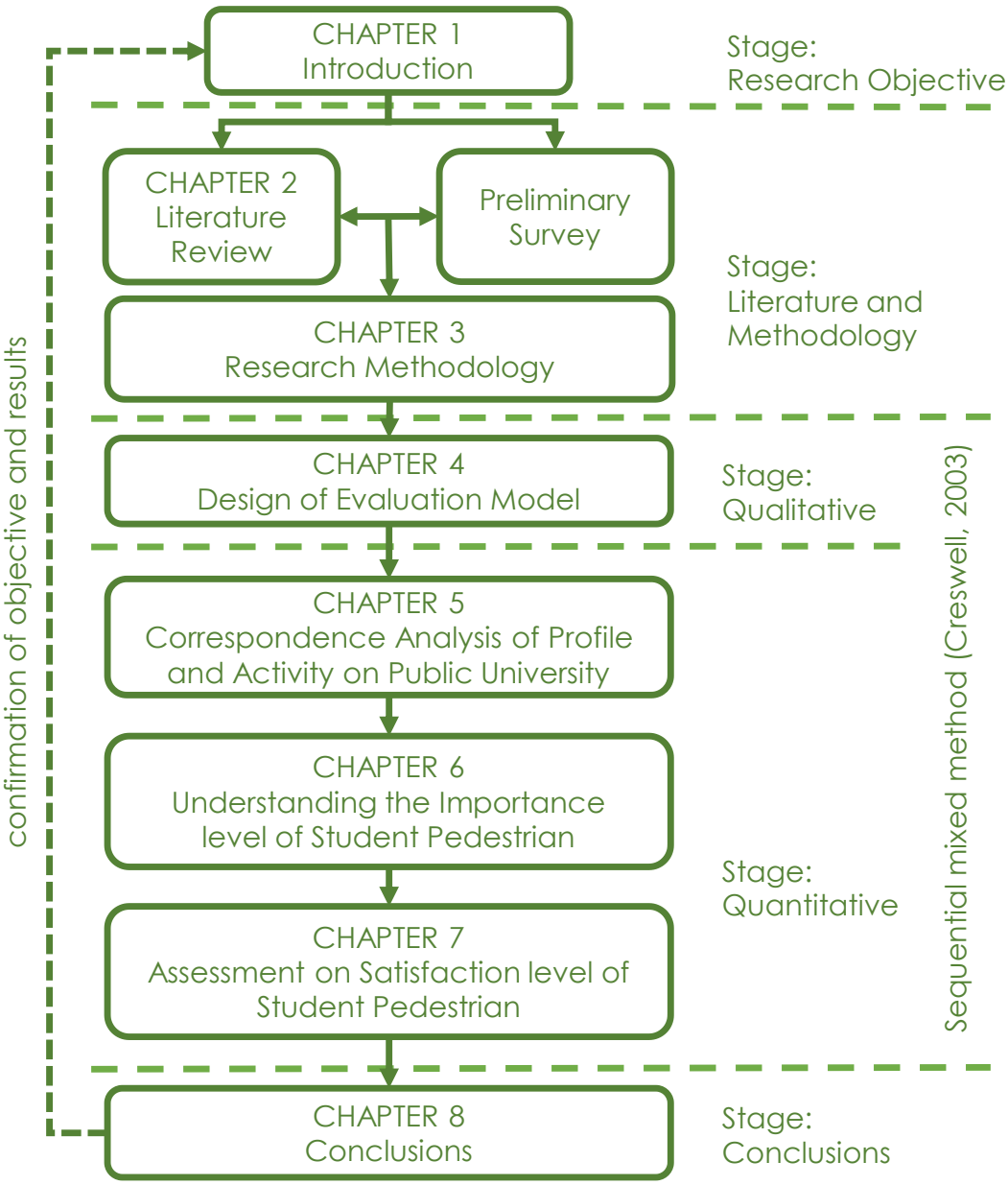


Figure 1.4 Research structure

Chapter 2. Review of Evaluation of Pedestrian Ways

This chapter contains the definitions related to research titles, research developments, studies on satisfaction with pedestrian ways, as well as the research context of campus pedestrian ways.

2.1 Introduction to Pedestrian Ways

A pedestrian way is a space used for walking activities. This space is often overlooked and has not received serious attention (Martokusumo et al., 2013). Path conditions are often as they are, without any clear plan. The physical construction of the tracks is often original and frequently exhibits poor material selection. In addition, the universal aspect of design is also regularly overlooked. Thus, people with disabilities find it very difficult to access pedestrian way.

In Indonesia, the pedestrian lane is getting serious attention. In some major cities, pedestrian lanes have already begun to be built well. Stakeholders have started to realize some paths in good condition. That is, the trend in cities is beginning to move towards better pedestrian ways.

This, however, is not so concerning pedestrian ways in the campus environment. Field observations found a gap between the conditions in the field and the regulations of the Government of Indonesia (Figure 2.1). The condition of pedestrian ways found was very diverse. The various conditions include: good condition, broken condition (slightly holey), damaged condition (severe), condition with many barriers, condition without pavement, and so on. Thus, the evaluation of campus pedestrian ways is very important and needs to be done still to know the user perceptions. This evaluation is also needed to determine the current condition of the pedestrian ways in order to improve the quality of the lane strategy immediately.

Figure 2.1 Preliminary observation

2.2 Previous Research of the Evaluation on Pedestrian Ways

Research on pedestrian way evaluation has been conducted extensively. The development of this research, however, is still centered on urban areas in general (Figure 2.2). This is due to the fact that the behavior and activities of people in urban areas tend to be dynamic. Thus, the space that accommodates activities needs to follow the development of both. Thus, research on the evaluation of the pedestrian on other objects is still a prospect to be explored in an effort to improve the quality of the pedestrian environment.

Table 2.1 shows that each pedestrian way object has different characteristics. The most important characteristic of all objects is the pedestrian himself. Urban objects and road areas have the same user characteristics as the general public. That is, although the research object is a different object, the tendency in assessment will be the same because the characteristics of its users are the same.

Table 2.1 Previous Research of Pedestrian Ways Evaluation

Previous Research	Object	User Characteristic	User Frequency	Mobility
(Nuzir & Dewancker, 2015), (Ranasinghe et al., 2015),	Urban	General	Often	Dynamic
(Erna et al., 2016)	Street Area	General	Often	Tend to be dynamic
(Zainol, Ahmad, Nordin, & Aripin, 2014)	Heritage	Visitor	Rarely	Static
(Florez & Muniz, 2014)	Stadium	Sportsman/sport fans	Tentative	Tend to be dynamic
(Iamtrakul & Zhang, 2014)	Station, TOD	Traveler	Often	Dynamic
(Luis M. Martínez, 2014)	Residential	Residents	Almost everyday	Static
(H. Tuydes-Yaman, O. Altintasi, P. Karatas, 2014)(Asadi-Shekari et al., 2014)	Campus	Student	Almost everyday	Dynamic

For the heritage object, stadium, and station, the characteristics of the users tend to be different even though they are urban communities. The characteristics of each pedestrian have a uniqueness that is attached to their status as a visitor (tourists), sportsmen, sport fans, and traveler. For the residential object, the dominant users are local residents while on campus the dominant users are students.

Each object also has a specificity in its frequency of use. A heritage object is an object with a frequency of rare use, while stage objects tend to be tentative. The use of the path is often in the urban objects, street areas, and stations. While residents and students tend to use the path almost every day.

In addition, users also have different mobility characteristics. Dynamic mobility tends to occur in urban objects, stations, and campuses. Mobility that tends to be dynamic occurs in the object area of the road and stadium. Meanwhile, heritage and residential objects tend to be static mobilization.

The segments evaluated with respect to this topic consist of three things: pedestrian, activity, and environment (Figure 2.2). The pedestrian segment is the most dominant aspect. While the segment environment is the least studied segment. The selection of environment segmentation tends to be done in low-quality environmental conditions. Thus, many evaluation efforts are needed. Meanwhile,

studies on pedestrian segmentation and activity tend to be done to improve pedestrian attitudes and aspects of awareness.

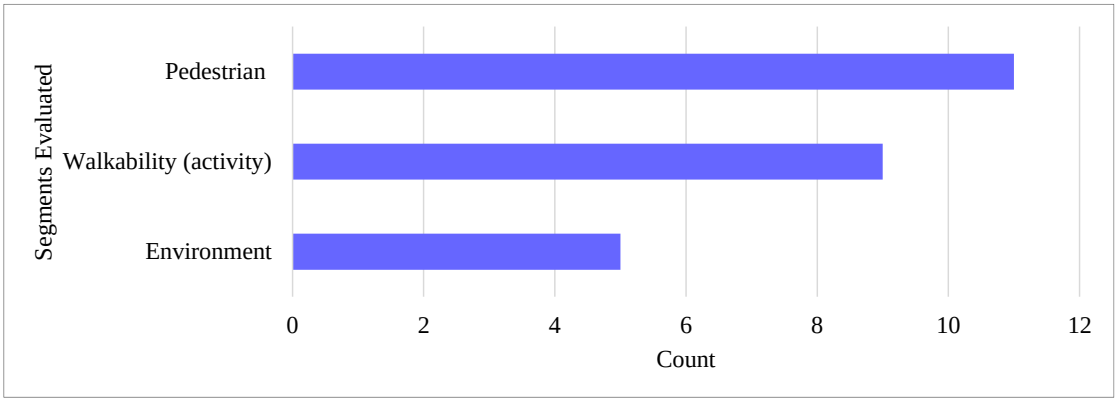


Figure 2.2 Segments evaluated

2.3 Evaluation Methods of Pedestrian Ways

Figure 2.3 shows the distribution of the methodology used in the evaluation studies. Quantitative methods are the most commonly used method. This method is chosen because it is an appropriate method for measuring the level of satisfaction. In addition, many variations in analysis can be used to see the level of satisfaction, the relationship between satisfaction variables, differences in satisfaction, influences that lead to satisfaction, and so forth. A qualitative method is usually used as a means of exploration for the phenomenon that occurs. This method is very significant in understanding the perceptions, attitudes, and behavior in depth (Iamtrakul & Zhang, 2014); a combined method is used to gain the benefits from both.

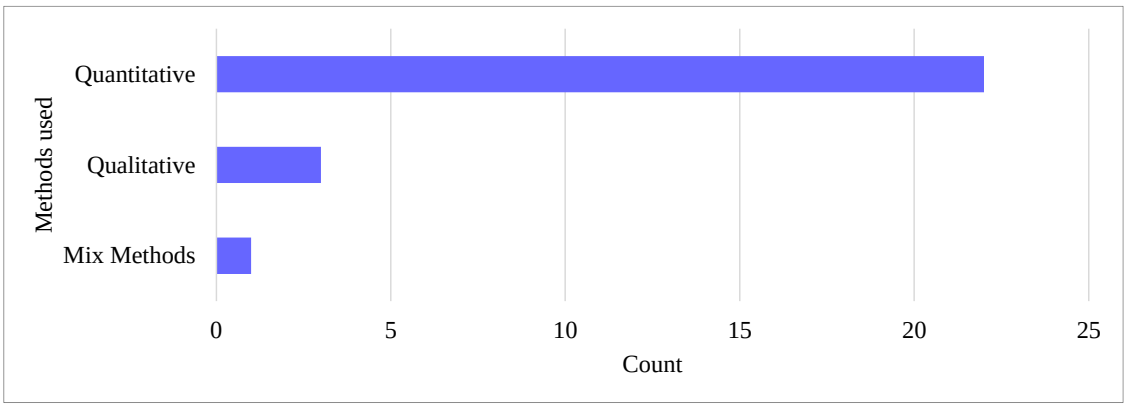


Figure 2.3 Methods used for evaluation of pedestrian ways

Table 2.2 shows the evaluation techniques used in pedestrian way evaluation research. The most dominant technique is the technique of measuring pedestrian satisfaction. This technique has the advantage of ease in understanding the things being evaluated. The evaluation is done by correlating

the assessed variables with the level of satisfaction with the path. This evaluation is not to see the weakness of a condition but to recommend material to improve the quality of the track.

Table 2.2 Evaluation Technic Based on Author

No.	Evaluation Techniques	Author
1	Satisfaction Evaluation (9)	(Rahimiashtiani & Ujang, 2013), (Luis M. Martínez, 2014), (Iamtrakul & Zhang, 2014), (Zainol et al., 2014), (Kim et al., 2014), (Zakaria & Ujang, 2015), (Sotoude, Ziari, & Gharakhlo, 2015), (Pratiwi et al., 2015), (Arshad, Bahari, Hashim, & Abdul Halim, 2016)
2	Assessment Evaluation (4)	(Moura, Paulo, & Gonçalves, 2014), (Nuzir & Dewancker, 2015), (Ranasinghe et al., 2015), (Erna et al., 2016)
3	Pedestrian Level of Service (4)	(Kang, Xiong, & Mannering, 2013), (H. Tuydes-Yaman, O. Altintasi, P. Karatas, 2014), (Asadi-Shekari et al., 2014), (Kadali & Vedagiri, 2015)
4	Measurement Evaluation (3)	(Zhou, Guo, Dong, Zhao, & Yang, 2016), (Lefrandt, Sulistio, & Wicaksono, 2016), (Moura, Cambra, & Gonçalves, 2017)
5	Pedestrian Index (2)	(Ghani Abdul, Shimizu, & Mokhtar, 2015), (Asadi-Shekari, Moeinaddini, & Zaly Shah, 2015)
6	Focus Group (2)	(Martokusumo, Kusuma, & Octaviana, 2013), (Ferrer, Ruiz, & Mars, 2015)
7	Examining Evaluation (1)	(Mateo-Babiano, 2016)

Satisfaction is defined as the fulfillment of desire (hope). Thus, satisfaction with the pedestrian way is the fulfillment of pedestrian expectations in obtaining adequate path quality. If a pedestrian has been satisfied with the paths he often uses, the frequency of use of the path will tend to increase. This will cause a positive impact on walking as a mode of transport.

The positive impact of the trend of improving walkability is the use of motor vehicles at close range will decrease thus reducing carbon emissions (Luis M. Martínez, 2014). This is in line with the statement by Iamtrakul & Zhang (2014) that motor vehicles cause a negative effect which causes climate change.

2.4 Positioning of the Evaluation of Pedestrian Ways

Based on the above explanation, this research seeks to address the condition of campus pedestrian ways which still have a gap between regulations and existing conditions. Thus, this study aims to evaluate the pedestrian pathways of the campuses. The campus object is chosen because it is one of the objects that is still rarely researched. This object has the following characteristics: the users are students, user frequency is on the scale of almost every day, and it has a dynamic mobility.

The segment chosen for this study is a focus on the environment. The pedestrian aspect as a profile and my perceived aspect as an activity, however, remain involved to make it easier to understand the path conditions. The combined method becomes a consideration in path evaluation. This is because the public campus objects, especially those in Lampung, have distinctive characteristics. Thus, this requires an evaluation model appropriate to the circumstances.

The use of qualitative methods in the early stages is needed to understand the phenomenon of campus pedestrian pathways until the process of modeling. The quantitative method in the next stage is the evaluation stage to measure the quality of the existing path. The evaluation technique chosen is the satisfaction measurement technique because this technique is a popular one and it is easy to understand the results of measurements.

Chapter 3. Research Methodology

This chapter contains the methods used in answering the research questions. Research questions were answered using the combined method in a sequence that is qualitative and quantitative. Methods of data collection and analysis are done in accordance with the stages of the method used.

3.1 Research Stages

Research on campus sidewalks at the state universities in Lampung is an evaluative research. This evaluation study was conducted in two successive stages (mixed method), namely, qualitative and quantitative stages (Creswell 2003). This research uses qualitative methods in the first stage as a means of compiling an evaluation model to fit the context of the research object. Meanwhile, the quantitative method is employed in the second stage to test and evaluate the object of research (Figure 3.1).

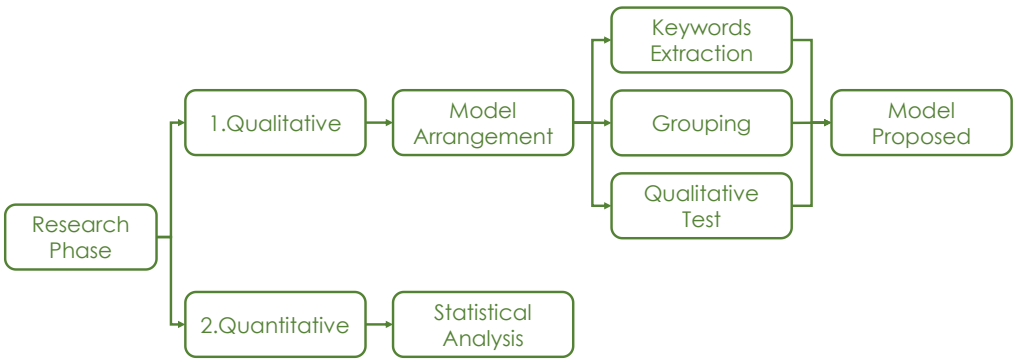


Figure 3.1 Research stage

A qualitative method is employed in the process of developing an evaluation model. This method aims to obtain keywords (variables) associated with the pedestrian way through the selected literature. Furthermore, selected keywords are grouped by similar meanings. The results of the grouping are tested through qualitative tests to produce a final evaluation model.

In the second stage, quantitative methods are used to evaluate campus pedestrian pathways. This method aims to measure student satisfaction with the physical condition of the existing path. Statistical analysis is used to measure the scale of student satisfaction with the path.

3.2 Qualitative Research Stage

3.2.1 Qualitative Data Collection Methods

Qualitative data collection consists of three parts: literature data collection, open questionnaire, and field observation. The first part, the collection of literature data, aims to obtain the keywords

(variable) connected to the theme ‘pedestrian way’. The literature data collected is derived from previous studies based on predetermined criteria. The selection of criteria is based on three things:

1. Research derived from international conferences and journals. These criteria are selected so that the selected data is of good quality.
2. The title of the study has keywords that are related to the evaluation keyword (measuring, quality, assessment, examination, statistical, quantifying, quantitative, qualitative, etc.), and perceptions of the use of pedestrian ways (satisfaction, comfort, etc.), (walkways, sidewalk, pathways, etc.). These criteria are chosen to obtain the right research target and are in accordance with the needs of the desired data.
3. Year of publication between 2013 and 2017. This criterion was chosen because evaluation research tends to be dynamic. Thus, the selection of a range of publications within the last five years is considered adequate.

The second part, the open questionnaire data, aims to obtain students' responses to the pedestrian pathways on their campus. An open questionnaire was chosen to explore students' perceptions of the paths. This exploration also aims to know and confirm the keyword (variable) of the literature and real conditions of the object of research. The questionnaire was distributed to students of Architecture Department, Engineering Faculty, University of Lampung. The population of these respondents was chosen based on the following criteria:

1. Students of the Architecture Department are regarded as the subjects who know more about space and activities.
2. The building of the Architecture Department is located in the central area of the University of Lampung.

The questionnaires submitted to the respondents included 3 questions: questions about whether they were satisfied (or not) with the campus sidewalks, the reasons for the first answer, as well as on their expectations of campus pedestrian conditions to change their perceptions of being satisfied or more satisfied. The first question aims to know their dominant answers. The second question aims to know the keyword for the reason for their first answer. Meanwhile, the third question aims to explore deeper their reasons for increasing the chances of adding keywords (variables).

The third part, the observation data, aims to determine the physical and spatial conditions of the campus sidewalks directly. Direct observation in detail was conducted by the author on the sidewalk located along Jalan Soemantri Brojonegoro. Documentation is done through continuous, continuous, and important lane shooting every 10–15 meters along the path (Figure 3.2).

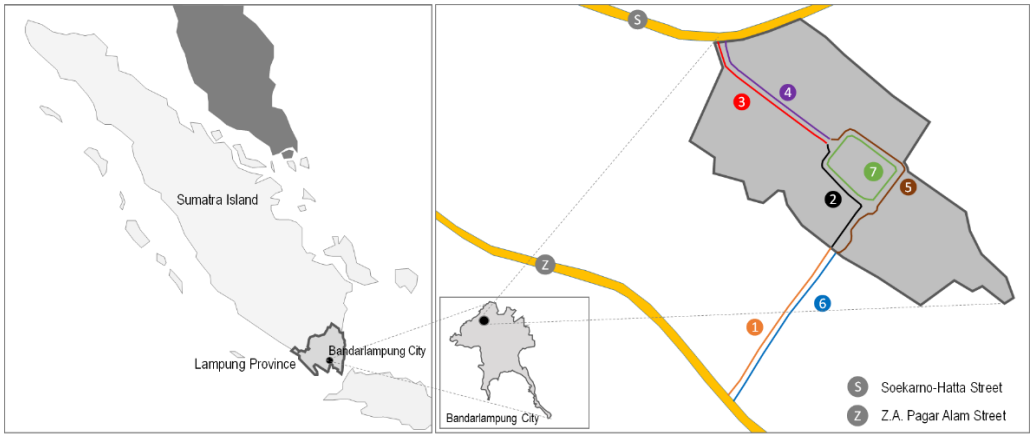


Figure 3.2 Qualitative research object

3.2.2 Qualitative Data Analysis Methods

A qualitative data analysis method was used in this analysis. Content analysis was performed on selected literature data, photo documentation data, and open questionnaire data. Content analysis aims to explore the type and number of keywords related to sidewalk topics. Keywords in the form of text and image data are converted into numeric data (0–1) and are grouped at once according to similar meaning using a table format. The zero (0) is used to represent the absence of the keyword while the one (1) is used to represent the keyword findings. This method aims to facilitate the process of understanding and the amount of data. Furthermore, distribution analysis is done in the table to learn the frequency of grouping keywords.

3.3 Quantitative Research Stage

3.3.1 Quantitative Data Collection Methods

Quantitative data collection was done through a closed online questionnaire (close-ended) conducted on three campuses, namely, University of Lampung (UNILA), State Islamic University of Raden Intan Lampung (UINRIL), and the State Polytechnic of Lampung (POLINELA). Questionnaires were distributed using a stratified sampling method to UNILA and UIN and a random sampling to POLINELA. In the use of stratified sampling, each unit of population (faculty) is determined by the number of samples, with a minimum of 30 respondents.

Table 3.1 Respondent Distribution of The University of Lampung

No	Population Unit (Faculty)	Number of Respondent
1	Faculty of Agriculture (AGRI)	40
2	Faculty of Economic and Business (EB)	36
3	Faculty of Education (EDU)	36
4	Faculty of Engineering (ENG)	55

5	Faculty of Law (LAW)	30
6	Faculty of Mathematic and Natural Science (MATH&NS)	40
7	Faculty of Medicine (MED)	45
8	Faculty of Social and Political Science (SOSPS)	32
	Number of Total Respondent	314

This number has been considered sufficient and achieves a pattern to be sampling (source). That is, the addition of the number of samples in each unit of population (faculty) is assumed not to affect the index of respondents significantly. While on the POLINELA campus, random sampling method was used because the characteristics of the population was only a single unit.

Table 3.2 Respondent Distribution of UIN Raden Intan Lampung

No	Population Unit (Faculty)	Number of Respondent
1	Faculty of Syariah (SYAR) *Syariah*: Muslim Law	47
2	Faculty of Islamic Economic and Business (ISEB)	75
3	Faculty of Tarbiyah (TARB) *Tarbiyah*: Education	42
4	Faculty of Ushuluddin (USH) *Ushuluddin*: Basic science of religion	34
5	Faculty of Dakwah (DAWH) *Dakwah*: Suggest to peaceful (Islam)	33
	Number of Total Respondent	231

Table 3.3 Respondent Distribution of State Polytechnic of Lampung

No	Population Unit (Faculty)	Number of Respondent
1	Single Population Unit	87

Questionnaires are divided into five sections consisting of respondents' background, daily activities of the student on campus, student walking activities on campus sidewalks, student importance level, student’s satisfaction level with the sidewalk.

3.3.2 Quantitative Data Analysis Methods

Quantitative data analysis methods using Microsoft Excel and JMP software (pronounced "jump") were used in the quantitative data processing (Likert scale). The research question has been answered through several types of analytical methods:

1. Frequency analysis

   Frequency analysis is used to identify the number of variables in each data set. This analysis is used in every dimension pertaining to the level of importance, satisfaction, and gaps related to a sidewalk.

2. Cluster analysis

   This analysis is used to find out the relationship in closeness between two categories' data. This analysis is a transformation of the proximity analysis in the form of a Cartesian diagram into cluster form. The proximity of this distance is indicated by the proximity of the position between two variables from different categories and the line connecting the two variables.

3. Analysis of Variants (ANOVA)

   ANOVA is used to know the difference between category data and the index of the variables studied. This analysis is used to know the difference in a respondent's profile to the interest index, satisfaction, and gaps related to a sidewalk.

4. Correlation and regression analysis

   Correlation analysis is used to determine the relationship between variables. The correlation result is influenced by the correlation value between zero (0) to one (1), positive or negative values, and significant values. The value of zero correlation means there is no correlation between variables, while a correlation value of one means the correlation is very strong. Correlation value is divided into five levels: very weak correlation (0–0.20), weak correlation (0.–-0.4), moderate correlation (0.4–0.6), strong correlation (0.6–0.8), and strong correlation (0.8–1). A positive correlation value means the relationship between variables is unidirectional, while a negative correlation value means the relationship between variables is not unidirectional (upside down) Correlation value only has a significant value at less than 5%. While regression analysis is used to determine the influence between a variable with independent variable.

5. Importance performance analysis

   This analysis is used to determine the position of a variable based on the level of importance and satisfaction. This analysis is divided into four quadrats: A quadrant, with high importance level condition while low satisfaction level; B quadrant, with condition of high importance and satisfaction level; C quadrant, with condition of low importance and satisfaction level; and D quadrant with condition of low importance level while high level of satisfaction.

Chapter 4. Design of Five Dimensions Model for Campus Sidewalks

This chapter contains the stages of the evaluation model design process. Stages include the selected literature, grouping the keywords, the proposed model, and the evaluation model test.

4.1 Keywords Extraction from Selected Literature

Table 4.1 Content Analysis of Keywords from Literature

No	Variable/Factor	Author 1*	Author 2*	Author 3*	Author 4*	Author 5*	Author 6*	Author 7*	Author 8*	Author 9*	Author 10*	Author 11*	Author 12*	Author 13*	Author 14*	Author 15*	Author 16*	Author 17*	Author 18*	Author 19*	Author 20*	Author 21*	Author 22*	Author 23*	Author 24*	Author 25*	Author 26*
1	Absence of obstruction (e.g., obstacle, pole, hole, etc.)	1	0	1	0	0	1	1	0	1	0	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0
2	Absence of unpleasant smell (e.g., garbage, rotten, etc.)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
3	Adequacy of light at night	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	1	1	0	0	0	0	1	0
4	Aesthetic (neatness, colored, patterned)	1	0	0	1	1	0	0	1	0	1	0	0	1	1	0	0	0	1	0	1	1	0	0	1	0	1
5	Air cleanliness (from dust, smoke, etc.)	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0
6	Availability of benches (seats around the sidewalk)	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	0	0
7	Availability of bus stops (public transport)	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1
8	Availability of hydrants	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Availability of landscape and greenery	0	1	0	1	0	1	0	0	0	0	1	0	0	1	1	1	1	0	0	0	1	0	0	0	0	0
10	Availability of median road to cross	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Availability of parking lots	1	0	0	0	0	0	0	0	1	0	0	1	0	1	1	1	0	1	0	1	0	1	0	0	0	0
12	Availability of shade trees	0	0	0	1	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	0	1	0	1	0	0
13	Availability of shelter (gazebo)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Availability of signage (traffic sign, map)	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0	1	1
15	Availability of street lighting and sidewalks (lamp)	0	1	0	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1	0	1	0	1	0	1	0	0
16	Availability of trash bins	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0
17	Availability of zebra cross (street crossing/crosswalk)	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	1	0	1
18	Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)	0	0	1	0	0	0	0	0	0	1	1	1	1	0	0	1	1	1	1	1	0	1	0	0	1	1
19	Connectivity with other path and facilities (parking area, bus stop, etc.)	0	0	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	1	1	1	1	0	0	0	0	1
20	Continuity of path without significant elevation difference	0	1	0	0	0	1	1	0	0	0	1	1	1	0	0	0	1	0	1	1	0	0	0	0	1	1
21	Convenience (protection) from weather conditions (e.g., heat, rain, wind)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0
22	Durability of path material (strong, not easily broken)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
23	Elevation of the sidewalk higher than the road surface	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
24	Pavement cleanliness	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	1	1	0	0	0	1	0	0	0	1
25	Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash)	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	1	0	1	0	1	0	0	0	1
26	Presence of barrier from vehicle (e.g., fence, bollard)	1	0	1	1	0	0	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	0	0	0	0	1
27	Quiet, away from noise pollution	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0
28	Roughness level of material surface (not slippery)	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0
29	Safe from physical contact with bicycles	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
30	Safe from physical contact with other walkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
31	Safe from slipping (sand, uneven paving)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
32	Safe from the dangers of crime and wild animals	0	0	1	1	1	0	0	1	0	0	0	1	0	1	0	0	1	1	0	1	1	0	0	0	0	1
33	Safe from traffic accidents (crossing road)	0	1	0	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1
34	Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
35	Visual attractiveness/ experience	1	0	0	1	0	0	0	0	0	1	0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	0
36	Width of path	1	0	1	0	0	0	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	0	0	1

Content analysis was employed in 26 selected studies to obtain keywords related to pedestrian path topics. The keywords extracted were only keywords that came from the author's exposure because

the keywords are considered important if they appear in more than just a table or image. This analysis resulted in 36 keywords (variables) related to the campus context (Table 4.1). Each keyword represents only one author. Thus, the number for a word represents the number of studies using the keyword.

4.2 Grouping by Small Focus Group Discussion (SFGD)

A small focus group discussion (SFGD) was conducted for the grouping of 36 variables. Four groups were formed with the following criteria: random, field corresponding to urban planning, with each group consisting of 2–3 people (Figure 4.1). Each group was given 36 cards that covered each variable. Groups were assigned the task of grouping variables according to pedestrian way topics within 30–45 minutes. Researchers only acted as facilitators without intervening in the groups and only answered technically related questions.

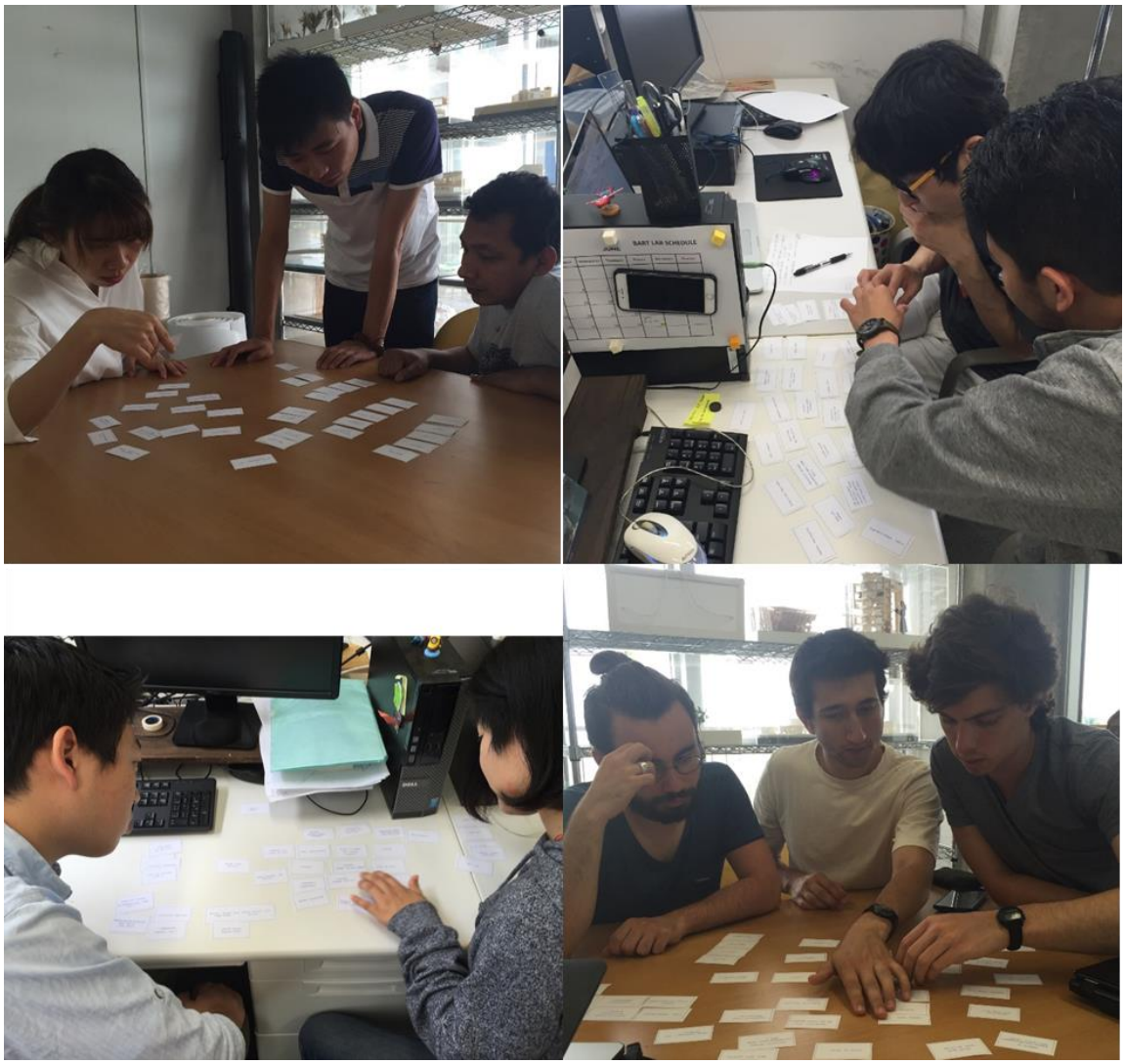


Figure 4.1 Activity of small focus group discussion

4.3 Model Proposed: Five dimensions Evaluation Model

Grouping of 36 keyword findings (variables) were done based on their similarities to make it easier to recognize the phenomena that occurs to pedestrian ways (Murwadi & Dewancker, 2017). Three small focus group discussions (SFGDs) were also conducted to get alternative perspective to assist authors in the processing the model. A comparative analysis was done from the result of grouping to find the best evaluation model based on campus context. It was obtained through five dimensions that contained similar variables. The 36 variables are spread over the appropriate corresponding five dimensions. The five dimensions include: quality, design, security, sensory, and facility. These five dimensions formed an evaluation model for campus sidewalk (Table 4.2).

Table 4.2 Five dimensions of model evaluation.

No	Dimension	Variable
1	Quality	1. Durability of path material (strong, not easily broken); 2. Roughness level of material surface (not slippery); 3. Absence of obstruction (e.g., obstacle, pole, hole, etc.); 4. Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)
2	Design	1. Width of path; 2. Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.); 3. Elevation of the sidewalk higher than the road surface; 4 Continuity of path without significant elevation difference (up/down repeatedly); 5. Connectivity with other paths and facilities (parking area, bus stop, etc.); 6. Aesthetic (neatness, colored, patterned); 7. Presence of barrier from vehicle (e.g., fence, bollard); 8. Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)
3	Safety	1. Safe from the dangers of crime and wild animals; 2. Safe from physical contact with other walkers; 3. Safe from physical contact with bicycles; 4. Safe from traffic accidents (crossing road); 5. Safe from slipping (sand, uneven paving)
4	Sensory	1. Convenience (protection) from weather conditions (e.g., heat, rain, wind); 2. Pavement cleanliness; 3. Visual attractiveness/experience; 4. Adequacy of light at night; 5. Quiet, away from noise pollution; 6. Air cleanliness (from dust, smoke, etc.); 7. Absence of unpleasant smell (e.g., garbage, rotten, etc.)
5	Amenities	1. Availability of landscape and greenery; 2. Availability of shade trees; 3. Availability of shelter (gazebo); 4. Availability of benches (seats around the sidewalk); 5. Availability of trash bins; 6. Availability of signage (traffic sign, map); 7. Availability of street lighting and sidewalks (lamp); 8. Availability of zebra crossing (street crossing/crosswalk); 9. Availability of median road to cross ; 10. Availability of parking lots; 11. Availability of bus stops (public transport); 12. Availability of hydrants

4.4 Quassessment Evaluation Model Test

4.4.1 The Dominant Factor of Student Satisfaction

Figure 4.2 Distribution of student satisfaction, shows that 25 students (68%) expressed dissatisfied with campus sidewalks which means that the most of students use sidewalks and that they have become a dominant feature that caused student dissatisfaction. These sidewalks are only the main lines on campus. The main lines include the sidewalk by the campus gates and terminal campus that extend from students' activities places or from main building on that campus.

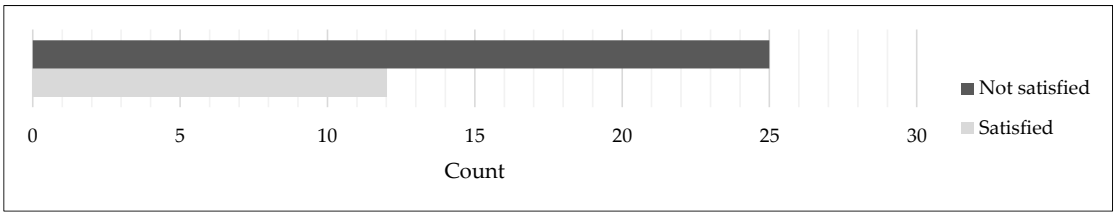


Figure 4.2 Distribution of student satisfaction

Figure 4.3 shows the distribution of student dissatisfaction. The discussion will focus on students' responses in detail as response of their dissatisfaction with sidewalks—the dominant of student expression. Student dissatisfaction was manifested by 14 keywords expressing the reasons why student were currently dissatisfied. The keywords were equipped name of dimension based on the model. Furthermore, determining of the dominant factors that caused student dissatisfaction was used distribution analysis.

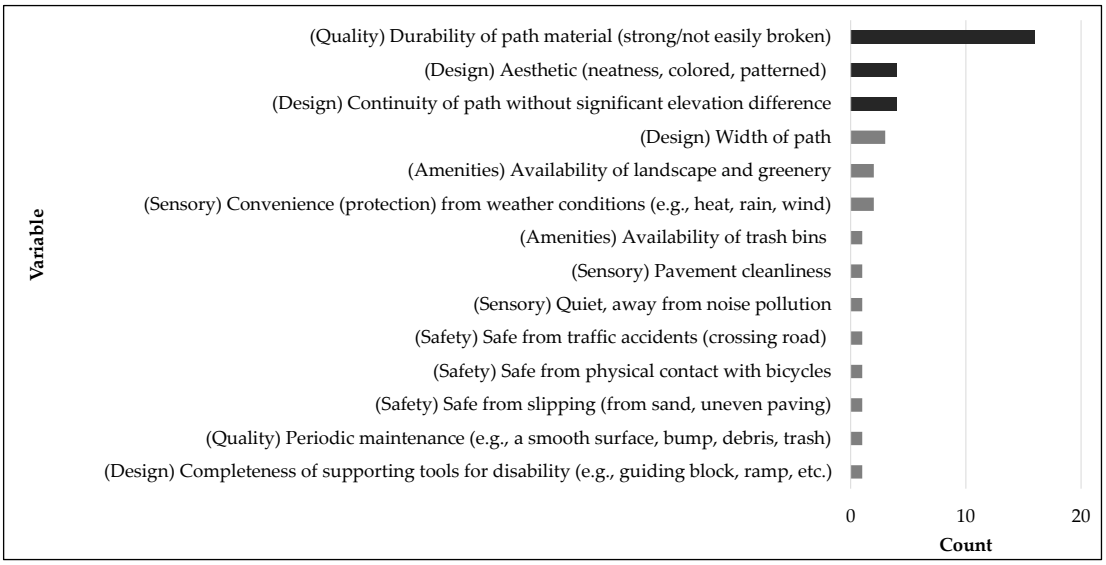


Figure 4.3 Distribution analysis of student dissatisfaction

The diagram indicates that the three biggest factors that reasoning of dissatisfactory by the students are durability of path material (Figure 4.4a), aesthetics (Figure 4.4b), and continuity of path without significant elevation differences (Figure 4.4c). Student dissatisfaction with the durability of

path material (16; 43%) was caused by the respondents' frequent encounters with broken paths. This could mean that the broken was seen on the main lane or en route to their class or their favorite places.

Student dissatisfaction with aesthetics (4; 10%) was caused by the fact that the students have seen more aesthetic sidewalks, or they have a good sense of aesthetics. In addition, there was dissatisfaction with the lack of continuous paths without significant elevation differences (4; 10%) due to the many different levels of elevation. This causes pedestrians to be more tired and affects their comfort. The differences between the dominant factors of dissatisfaction and other factors seems quite significant, which means that the dominant factors are the most important factors that need attention in order for the majority of the users to be satisfied with sidewalks.

(a) (b) (c)

Figure 4.4 Dominant factors related to pedestrian dissatisfaction: (a) durability of path material; (b) aesthetics, (c) continuity of path without significant elevation differences.

The distribution analysis diagram in Figure 4.5 shows that the three biggest factors related to students' expectations are durability of the sidewalk material (Quality), aesthetics (Design), and availability of shelter (Amenities). Durability of path material (Quality) was most frequently mentioned as being satisfactory (18; 49%) which means that students hope an overall refinement in the conditions of the damaged pavement. Better durability is considered the most important (priority) factor for increasing student satisfaction.

Another dominant factor for improving student satisfaction is aesthetic. Paving, neatness, color, and pattern could be a good solution to improving aesthetics. The third biggest expectation shows that gazebos are a factor which could increase student satisfaction, considering that Indonesia is a tropical country with two seasons—drought and rain. Therefore, shelters (gazebos) greatly help students get relief from hot or rainy conditions.

The quality dimension has become very important because students have high expectations in this regard. Improvement of this dimension will greatly affect the pedestrian satisfaction directly. Concerning the design dimension, pedestrian satisfaction seems to be affected when the quality factor is met. This dimension of aesthetic demand will increase if the quality of the existing dimension achieves considerable satisfaction. Thus, these dimensions seem to be linearly proportional. Meanwhile, the amenities dimension is a dimension of the fulfillment of pedestrians' desire to run

their activities. Satisfaction with this dimension depends only on the fulfillment of the facility for each track. So if there are additional amenities on the sidewalk, student satisfaction will increase.

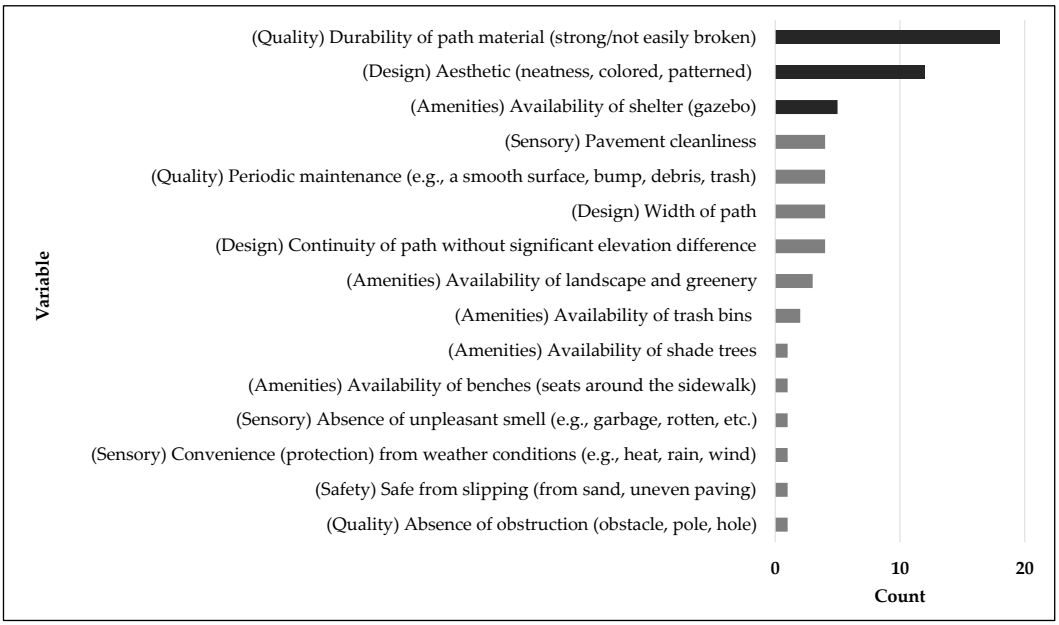


Figure 4.5 Distribution analysis of student expectations

4.4.2 The Dominant Factor of Observation

This analysis yielded ten variables derived from the documentation photos. Results of the distribution analysis (Figure 4.6) shows the factors that are not achieved on campus sidewalks, namely, the absence of obstructions (90), continuity of the path without significant elevation differences (50), and durability of the path material (47).

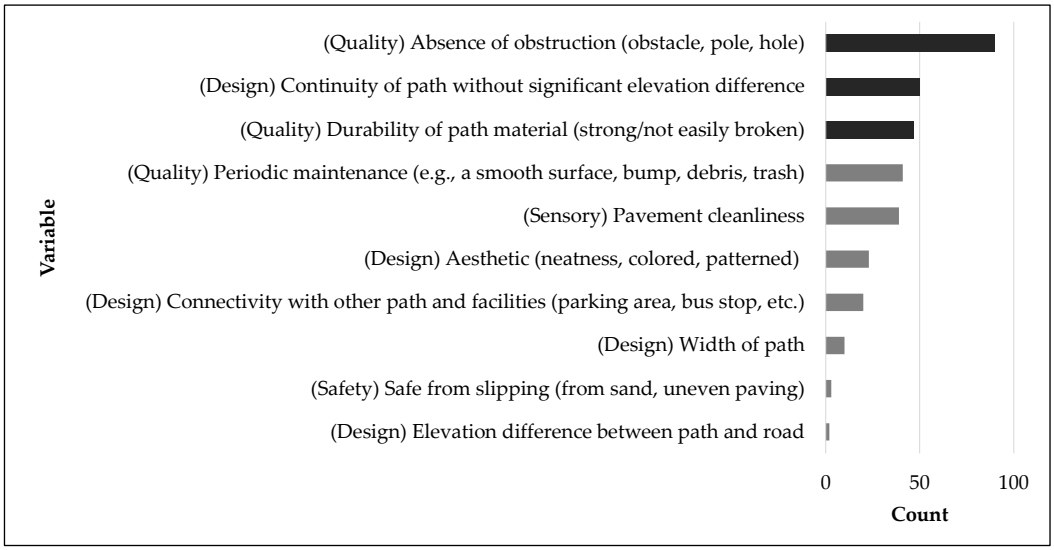


Figure 4.6 Distribution analysis of observation

The most unsuitable dominant factor was an unobstructed path because many obstacle were found along the sidewalk. These include permanent and not permanent obstructions. A permanent obstruction is difficult to eliminate because it is embedded in the floor pavement. Also, an obstruction belongs to a particular structure. Permanent obstructions include shaped signposts, concrete, and trees. Meanwhile, the not permanent obstructions such as street vendors, advertisements, stones, and parked vehicles, are easy to clear (Figure 4.7).

(a) (b)

Figure 4.7 Obstruction conditions: (a) permanent obstruction and (b) impermanent obstruction

Figure 4.8 indicate the distribution of obstructions for each sidewalk zone. The following graph shows that permanent obstructions (black bars) are more predominant than not permanent ones (gray bars); that is, a pedestrian will find permanent obstructions while walking in any area. The most predominant permanent obstructions are in SW7 since SW7 has many signposts and concrete. These conditions have narrowed the track so that running on the pathway is disrupted.

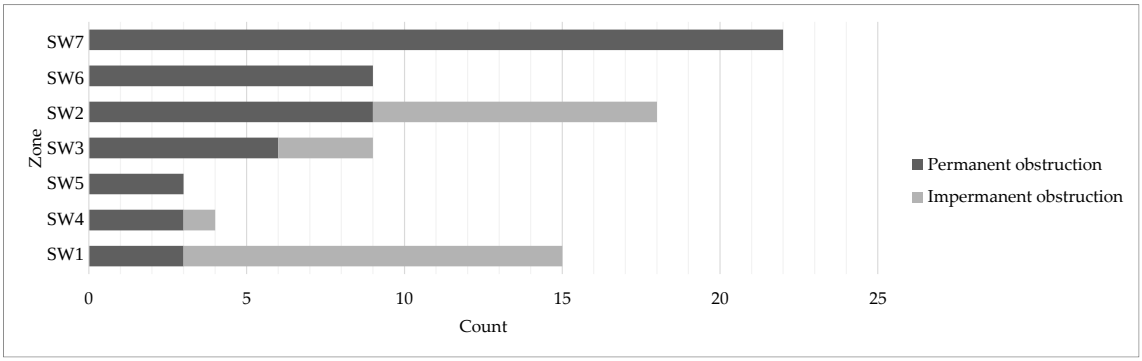


Figure 4.8 Distribution of obstructions

Meanwhile, not permanent obstructions are likely fewer than permanent obstructions. In certain zones (SW5, SW6, and SW7), no not permanent obstructions existed because the line in the zone is a path to the exit of the campus. On the other hand, the most common not permanent obstructions were in SW1. The most frequent not permanent obstructions were street vendors (SV) and billboards since SW1 is the main access to the campus area. Thus, this area is considered strategic for traders. Unfortunately, the track conditions have been affected by this obstruction.

Permanent and not permanent obstructions require different removal methods because of the nature of the obstructions. The not permanent obstacles are more easily removed because they are not

bound to the structure of the pavement. Meanwhile, deletion of major permanent obstructions is more difficult.

The second unsuitable dominant factor was a continuous path without significant elevation differences on account of the many factors that affect pedestrian comfort. Pedestrian comfort is affected because pedestrians have to keep adjusting to the elevation differences on the sidewalk. These recurring elevation adjustments result in fatigue. So, we found some pedestrians who were walking on motor roads, which is definitely dangerous.

Elevation differences (EDs) are divided into three criteria (Figure 4.9): ED low (<3 cm), ED medium (3–10 cm), and ED high (>10 cm). The chart shows that high EDs were very predominant in all zones. Medium EDs were found only in two zones (SW1 and SW2), whereas low EDs were found only in SW6. This means that pedestrian comfort is greatly affected by the high number of EDs in the lane. The following figure shows that high EDs (SW6) were more predominant than the other EDs. This is because this path provides access to the buildings, thereby forming significant elevation differences. Thus, a sloping elevation adjustment is required for pedestrians (Figure 4.10).

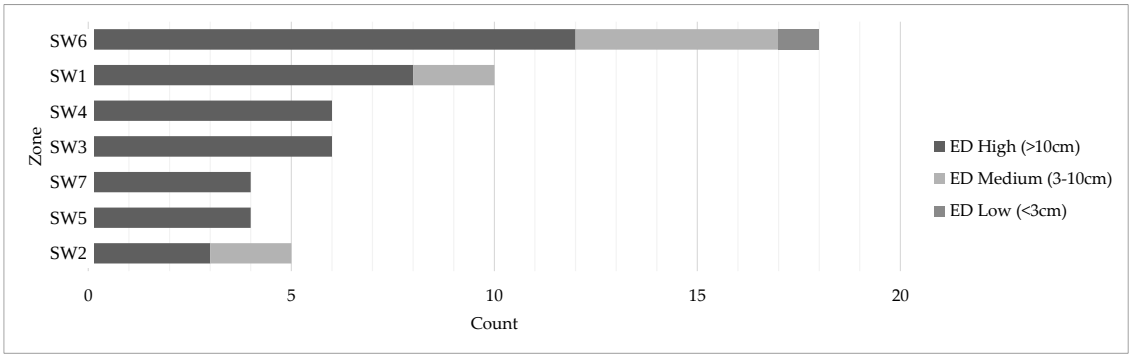


Figure 4.9 Distribution of continuity of path without significant elevation differences

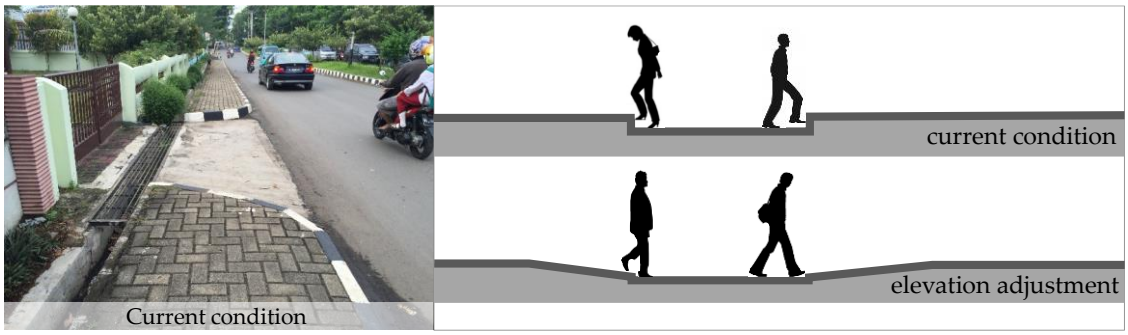


Figure 4.10 Elevation adjustment of campus sidewalk

The third unsuitable dominant factor was the durability of the path material because many path materials were broken along the route to the main campus activity. Broken materials were divided into two categories: small and big damage (Figure 4.10). The criterion for big damage was that the damage had huge dimensions (massive), while small damage meant damage dimensions of not more than 40

cm^2. This damage occurred because of poor foundations and broken sidewalk frames. Big damage areas were most common in SW6 (Figure 4.12a). The sidewalk in this area had many areas of big damage because of access to the building over the pavement. Pavement damage was caused by vehicular traffic. Floor repair work and the selection of a stronger pavement are expected to improve conditions for better pavement quality.

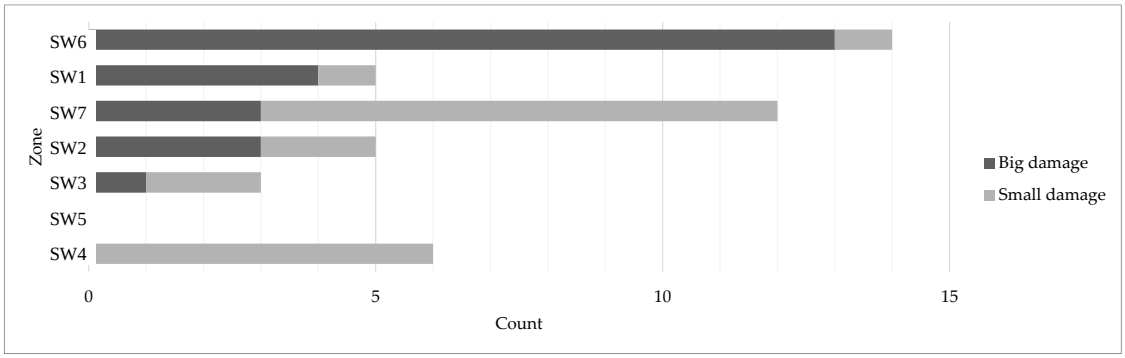


Figure 4.11 Distribution of broken materials

Meanwhile, small damage was most common in SW7 (Figure 4.12) because of the fragility of the pavement owing to collisions with hard objects and natural factors (puddles). In SW5, no damage was found because a lot of spots in that area were not paved (Figure 4.12 Pavement condition: (a) big damage (SW6); (b) small damage (SW7); (c) no pavement (SW5).). In addition, paved walkways were mostly in good condition.

(a) (b) (c)

Figure 4.12 Pavement condition: (a) big damage (SW6); (b) small damage (SW7); (c) no pavement (SW5).

4.4.3 Comparative Analysis per Zone

The following distribution analysis shows the condition of each sidewalk zone using the dominant factors. The most unsuitable dominant factors were mostly in SW6 (Figure 4.13). This zone had two of the three largest dominant factors: periodic maintenance (smooth surface, bump, and debris), continuity of path without significant elevation differences, and durability of path material. These three unsuitable factors affected the convenience of walking for student pedestrians returning through this main entrance.

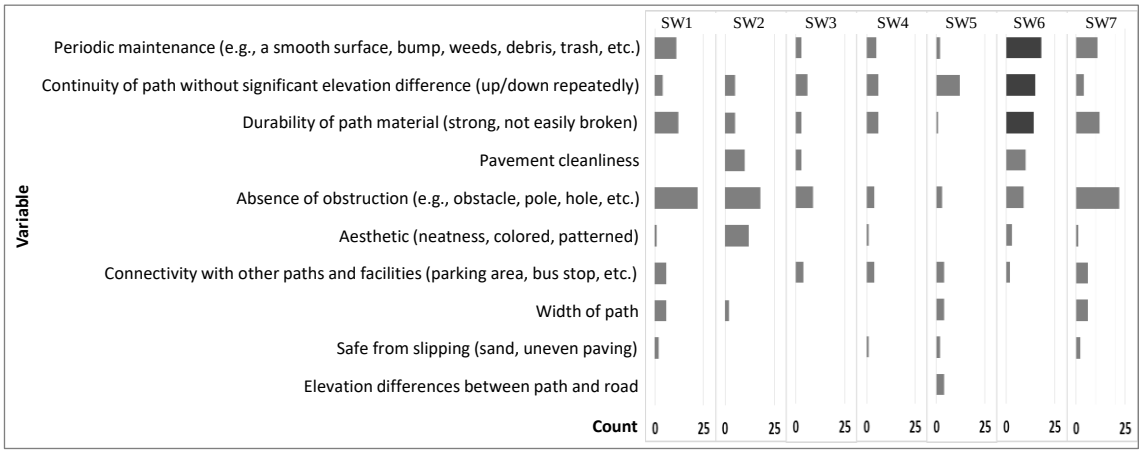


Figure 4.13 Distribution of factors per zone

Another analysis of distribution per zone shows that the factors present in SW4 were lower (not dominant) than those in other zones which means that SW4 was in better condition than the other sidewalk zones. Conditions in SW4 seemed to be wide, clean, flat, a little resistant, and good. Thus, pedestrian activity along this sidewalk was likely to be comfortable.

Meanwhile, other conditions show that the factors demonstrate in SW6 appeared to be higher (dominant) than those in the other zones which implies that SW6 had the worst conditions among the zones. Track conditions in this zone were dirty, riddled with obstacles, broken, and had many significant elevation differences. Therefore, pedestrian activity on this sidewalk was likely to be uncomfortable compared to that along the other paths.

The dominance of certain dimensions was showed by another analysis in different zones. In the design dimension, SW4 had a design with better conditions compared to those of the other sidewalk zones. This was indicated by the factors (Design) present in SW4 which were dominant. That is, in the design dimension, SW4 was the best compared to that of the other zones.

The diagram shows that SW5 was not dominant in the quality of existing dimensions. Based on the sidewalk map, however, SW5 had many paths that were not paved (Figure 14c). Thus, the best quality of the existing dimension cannot be addressed in SW5. Besides SW5, SW4 was a zone in which the quality conditions were better than those of the other zones. This is indicated by the factors (Quality) present in SW4 which was not dominant. That is, the quality dimension in SW4 was the best compared to that of the other zones.

Meanwhile, SW4 had the best path among the lanes. The main characteristics of SW4 were that it was accessible to the campus, flat, clean, and wide. That is, the convenience of walking on campus will improve if the other zones have the same conditions as SW4.

Chapter 5. Understanding of Correspondence Analysis of Student Profile and Student Activity on Public Campus

This chapter contains a description of respondents' profiles, student activity, a proximity analysis between profiles, and a proximity analysis between student profile and activity. This chapter aims to understand the indications contained in the student phenomenon associated with their activities while on campus.

5.1 Distribution Analysis of Student Profile

This study used Profile (P) respondents in the form of gender (P1), batch (P2), modes of transportation (P3), and participation in organization (P4). This section describes the overall condition of the campus public as well as the profile of each campus.

Figure 5.1 shows the distribution of male and female respondents at the public universities. Female respondents were more predominant than male respondents with significant differences. The predominance of female respondents was supported by more numerous female respondents on UINRIL (58%) and POLINELA (61%) campuses. While on the UNILA campus, the composition of respondents between men and women was balanced. Cluster correspondence analysis (Figure 5.2) asserts that male students have a close relationship with the UNILA campus while female respondents have it with the two other campuses.

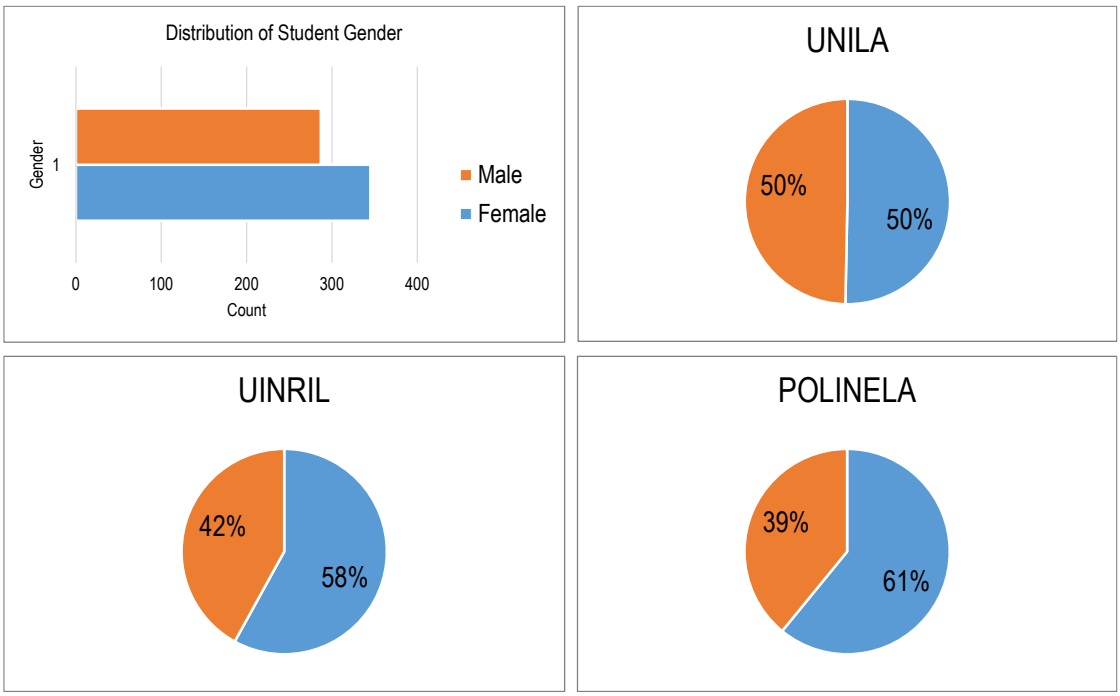


Figure 5.1 Distribution of student gender

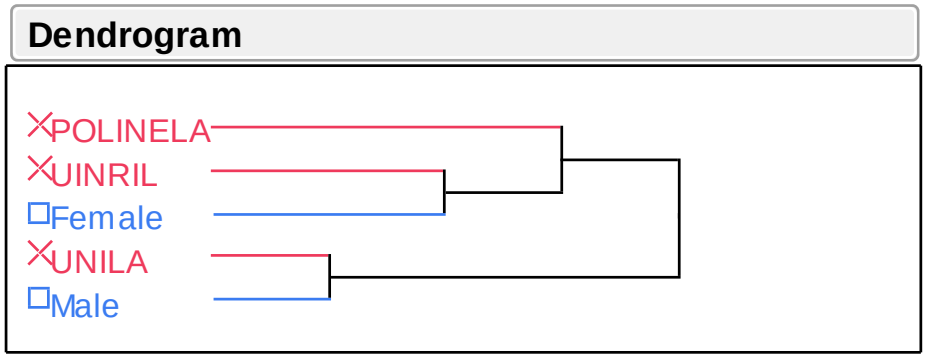


Figure 5.2 Cluster correspondence analysis of university and gender

Figure 5.3 shows the distribution of the composition of the four student batch levels from 2017 to 2014 and earlier. Overall, the distribution of batches tends to be even and only has an average difference of 20 respondents. The student class of 2017 are the dominant respondents compared to other batches. On the UNILA campus, the majority of respondents came from 2015 (33%) and 2014 (30%), while on the UINRIL campus, they came from 2014 and earlier (30%) and 2017 (25%). But the spread on the UINRIL campus tends to be more even than that on the UNILA campus. While on the POLINELA campus, the distribution was only in the three batches with the dominant ones being those of 2017 (58%) and 2016 (41%). Correspondence analysis (Figure 5.4) confirms the close relationship between campus and batches, i.e. UNILA by 2015, UINRIL by 2014 and earlier, and POLINELA by 2017.

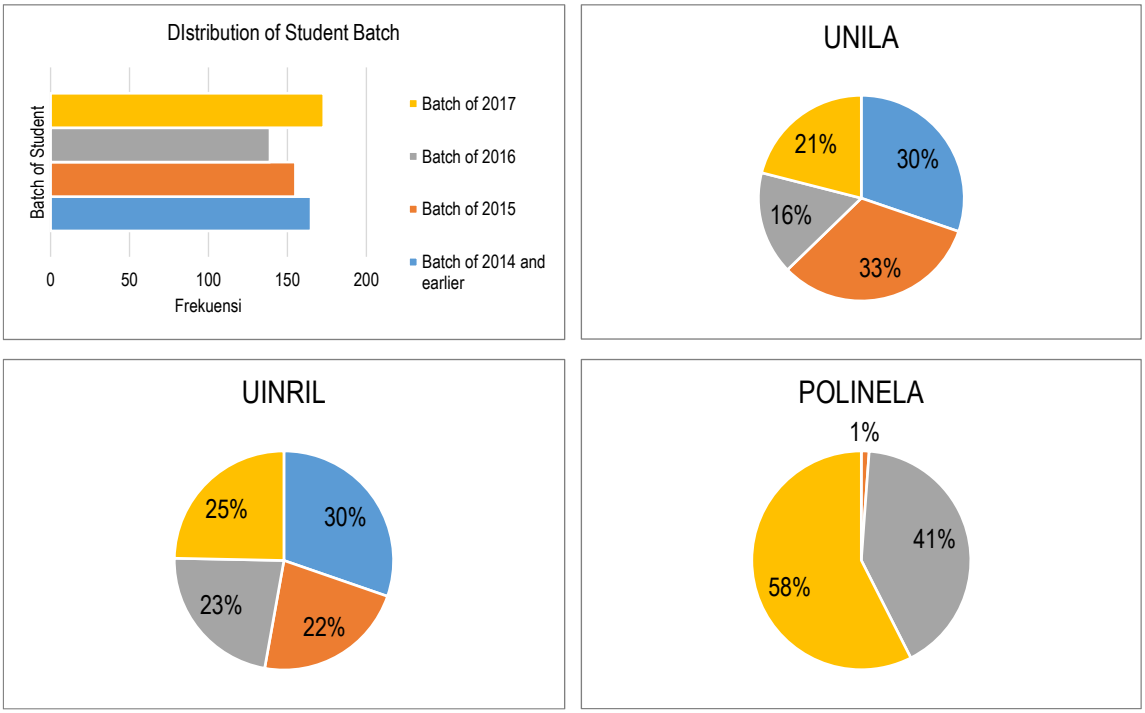


Figure 5.3 Distribution of student batch

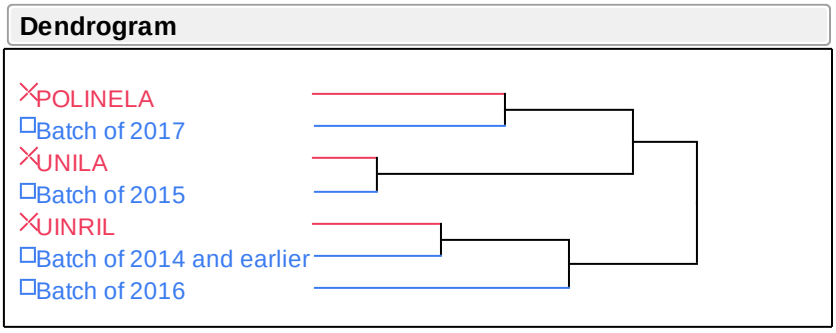


Figure 5.4 Cluster correspondence analysis of university and batch

Figure 5.5 shows that the order of frequency of the most dominant transportation modes includes motorcycles, walking, public transport, cars, and bicycles. Motorcycles are the most significant mode chosen to outperform other users. All campuses have the same tendency in the dominant mode of transportation. The use of motorcycles on the UNILA campus reached 57%, UINRIL 50%, and POLINELA 64%. Thus, on POLINELA motorcycles are the most widely used.

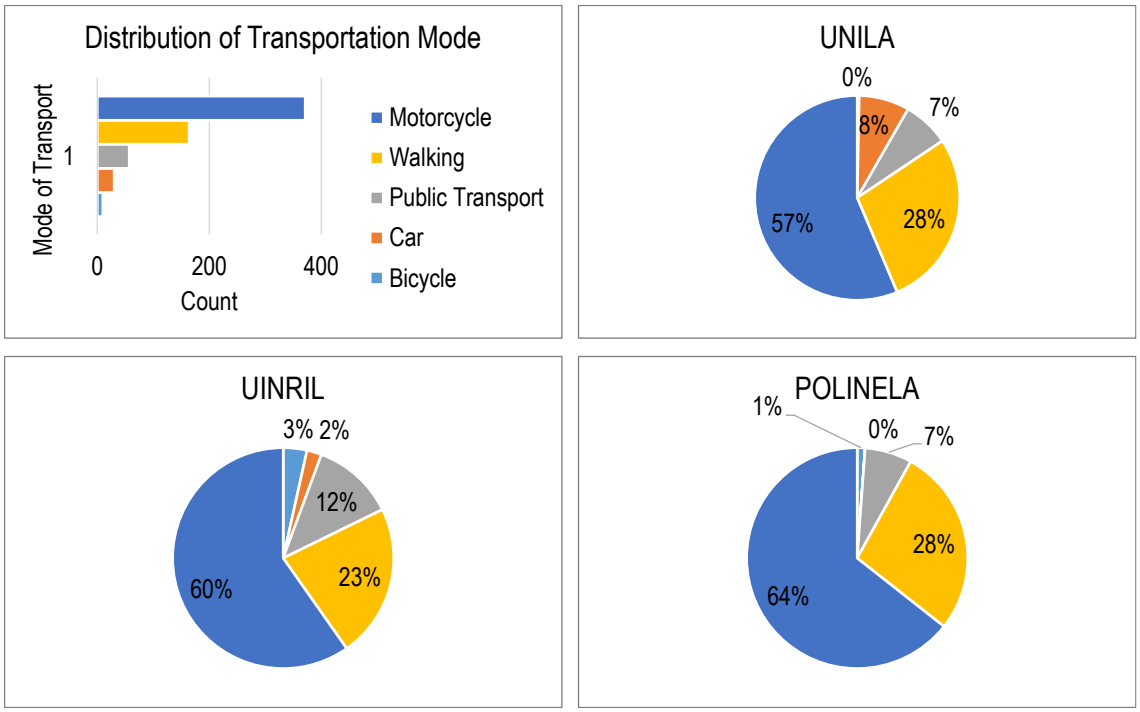


Figure 5.5 Distribution of transportation mode

Correspondence analysis (Figure 5.6) shows the close relationship between campus and transportation mode, i.e. UNILA with walking, UINRIL with public transport, and POLINELA with motorcycles. That is, even though the motorcycle is the dominant mode of transportation on all campus, the tendency is that UNILA students have a closer relationship with walking as a mode of transportation.

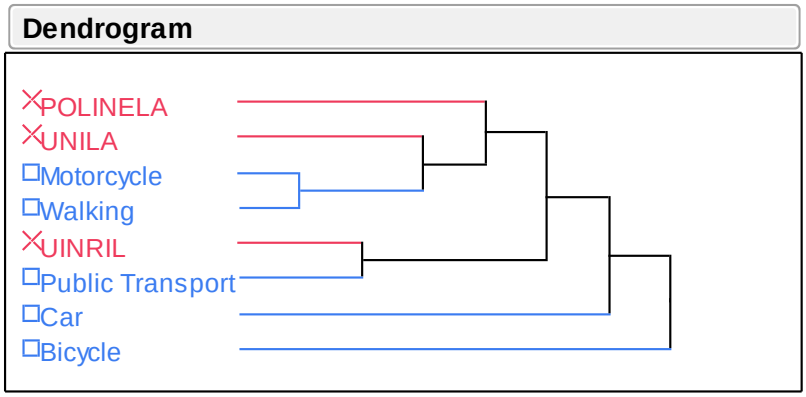


Figure 5.6 Cluster correspondence analysis of university and transportation modes to campus

The reason students use the transportation mode they use is for reasons of speed, that there is no alternative, or that it is simpler. Speed reasons are the most significant. This means that rapid access to their destination is important to the majority of students (Figure 5.7). This is because students tend to be efficient with their time and have different activities. Alternate reasons that students submitted included no alternative, simpler, cheaper, and more comfortable. Meanwhile, the reasons least included were healthy, efficient, and safety.

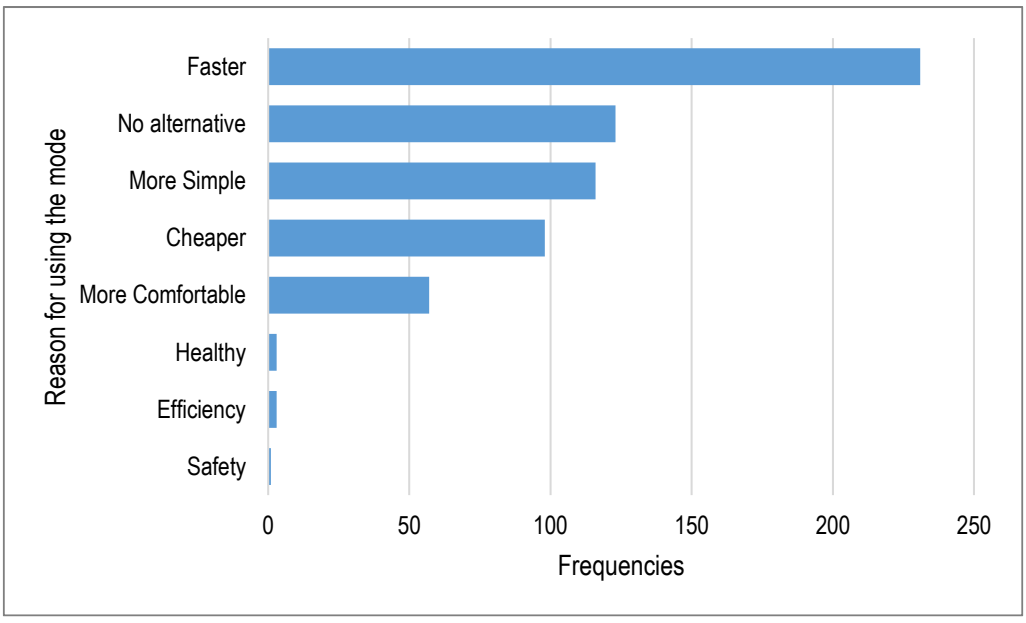


Figure 5.7 Distribution of transportation mode reason

The cluster correspondence analysis in Figure 5.8 shows the proximity relationship between students and their reasons for using modes of transportation. UNILA students who tend to walk more have a close relationship with the reason ‘no alternative’. UINRIL students who tend to use public transport more have a close relationship with the reason ‘cheaper’. Meanwhile, POLINELA students who tend to use motorcycles more have a close relationship with the reason ‘more quickly’.

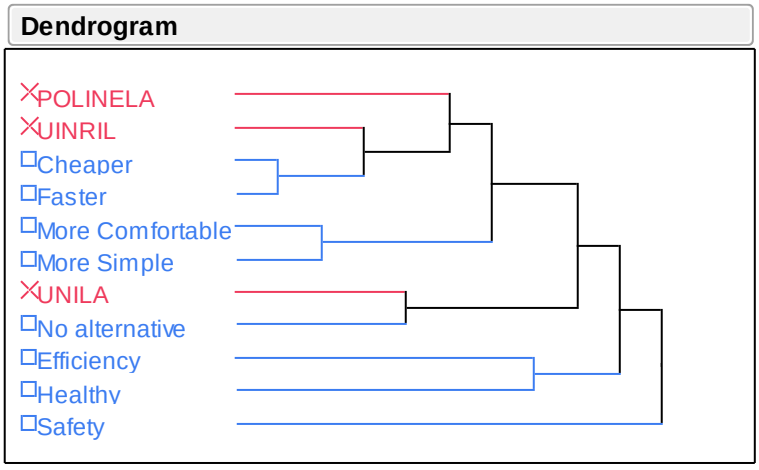


Figure 5.8 Cluster correspondence analysis of the university and the reason for using the mode of transportation

Figure 5.9 shows the distribution of student participation in organizations. The order of dominance for student participation in organizations includes: yes (quite active), yes (very active), no, and yes (not active). So, in general, students participate in student organizations more often (75%) than not.

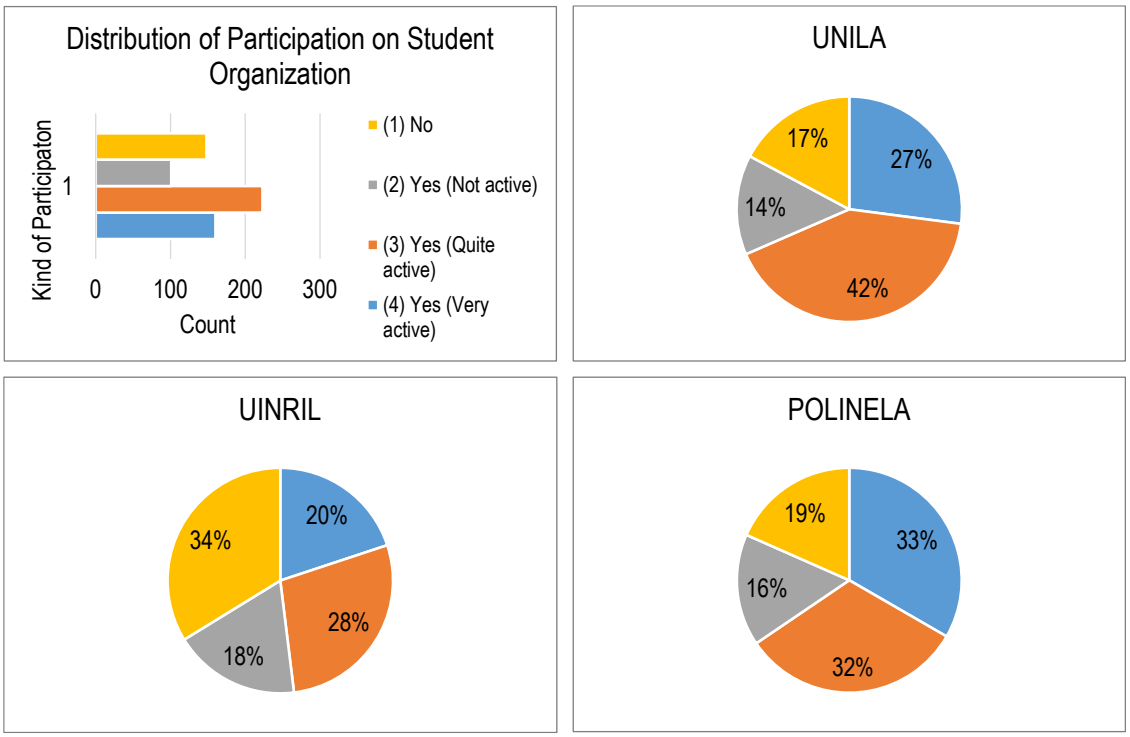


Figure 5.9 Distribution of participation in student organizations

The majority of students tend to be actively involved in organizational activities. However, this trend is predominant on the UNILA campus (42%) while on the POLINELA campus the prevalent

profile is the variable yes (very active) but only at 33%. While on the UINRIL campus, students who are not involved in the organization are more prevalent (34%). This shows that interest in organizations is higher among students of UNILA and POLINELA than among UINRIL students (Figure 5.10). Based on the above description, the population shows females predominate over males. In regard to participation in the organization, the percentage of students involved in student organizations reached 75% (dominant).

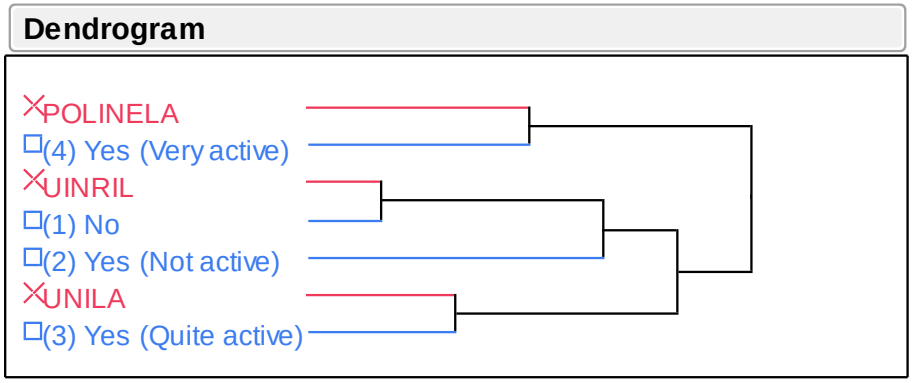


Figure 5.10 Cluster correspondence analysis of the university and participation in student organizations

Table 5.1 shows the recapitulation of the student profile analysis on each campus. UNILA students have proximity relationship level one only with 2015 batch category. Meanwhile, other proximity relationship that is in the category of male (gender), walking (transportation mode), and yes-quite active (participation on student organization).

Table 5.1 Profile correspondence

Profile	Profile category	University
Student Gender (P1)	Female	UINRIL*, POLINELA
	Male	UNILA
Student Batch (P2)	2015	UNILA*
	2014 and earlier	UINRIL
	2017	POLINELA
	2016	
Transportation Mode (P3)	Motor cycle	POLINELA* (Faster)
	Walking	UNILA (No alternative)
	Public Transportation	UINRIL (Cheaper)
	Car	
	Bicycle	
Participation on Student Organization (P4)	No participation	UINRIL*
	Yes (quite active)	UNILA
	Yes (very active)	POLINELA
	Yes (not active)	

*) first correspondence

UINRIL students have a close relationship level one with the category of female (gender) and no participation (student organization). Other proximity relationship to UINRIL student is batch category 2014 and earlier and walking (transportation mode). POLINELA students have proximity relationship level one only with category motor cycle (transportation mode). Other proximity relationships are category female (gender), batch 2017, yes-very active (participation on student organization).

5.2 Distribution of Student Activity

In this section, the study used four activity types: duration of activity on campus (A1), return frequency after 7 pm (A2), walking frequency on campus (A3), and walking duration while walking on campus (A4). This section describes each activity on the three campuses as well as their proximity to the campus.

Figure 5.11 shows the majority of students were in the campus environment for 5–7 hours a day and 3–5 hours a day. The most dominant activity for UNILA and POLINELA students is to be on campus for 7–9 hours while students at UINRIL are on campus for 3–5 hours (Figure 5.12 Cluster analysis of campus and duration of daily activity on campus). UNILA and POLINELA students stay longer on campus for different reasons. Older college students are on campus due to greater participation in organizational activities than on other campuses, while the POLINELA students stay due to a solid lecture system and a lot of practice time. The differences in these conditions indicate that the duration of activity on campus is influenced by the system of campus recovery and participation in student organizations.

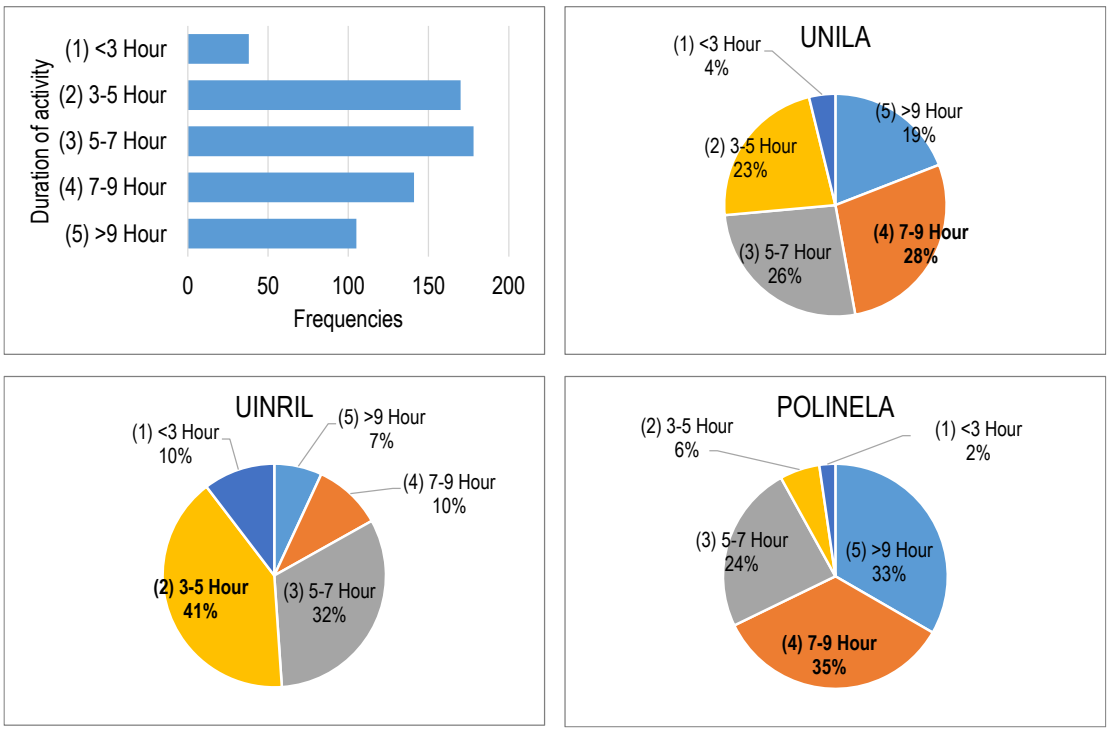


Figure 5.11 Distribution of student activity duration on campus

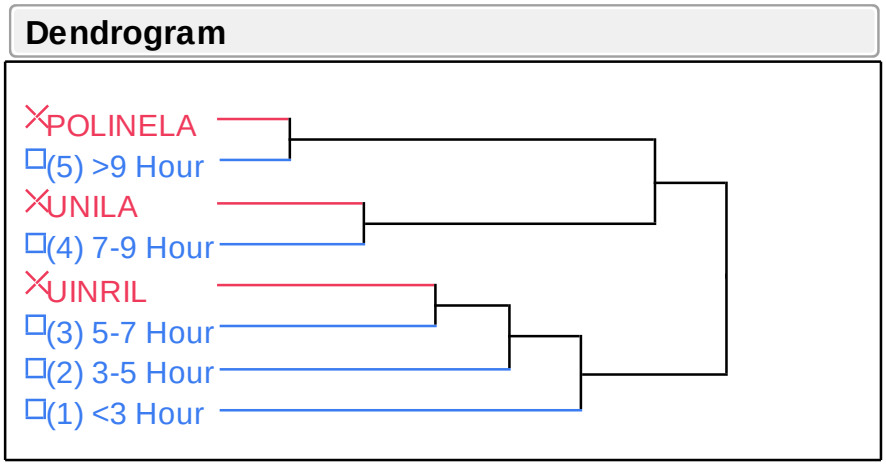


Figure 5.12 Cluster analysis of campus and duration of daily activity on campus

Figure 5.13 shows in terms of frequency that the majority of students come home late at night rarely after 7pm. Meanwhile, a minority of students never did. UINRIL's students (see Figure 5.14) are the most common students who never do this at all and who have close relationships with very rare frequencies (43%). While students at UNILA and POLINELA tend to have the same dominance frequency, that is 1–3 times a week: 27% for UNILA and 30% for POLINELA. This means that the duration of student activity on campus has an influence on the return frequency after 7pm.

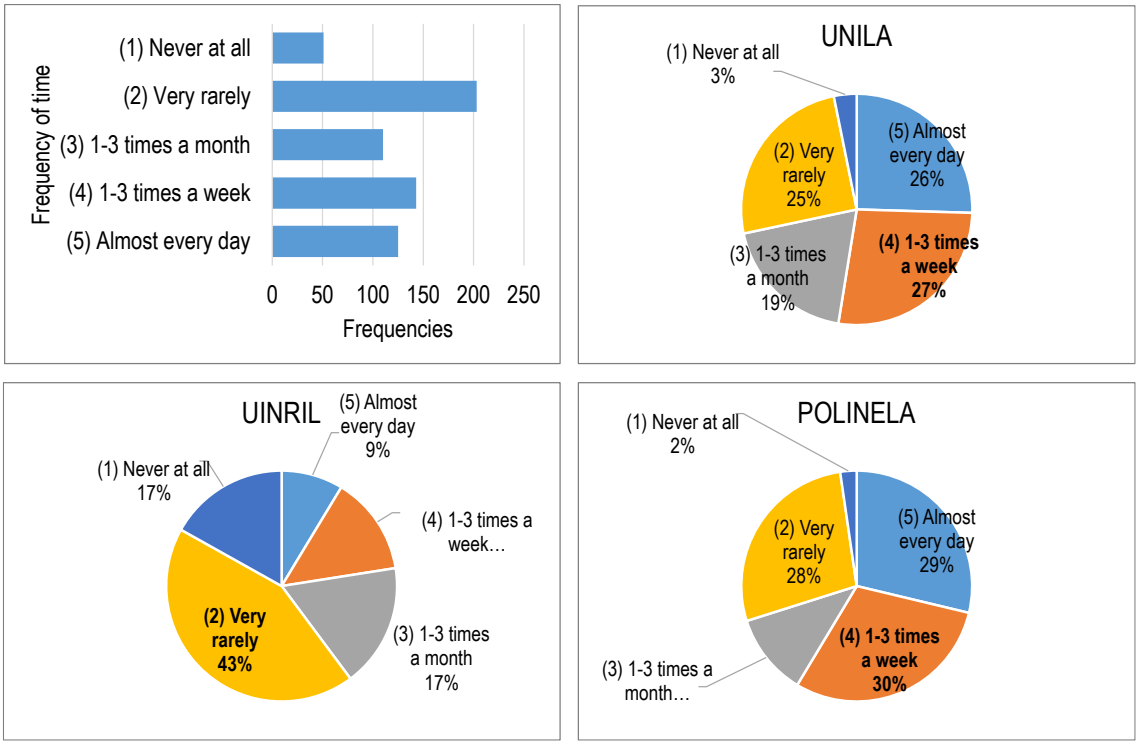


Figure 5.13 Distribution of return frequency after 7 p.m.

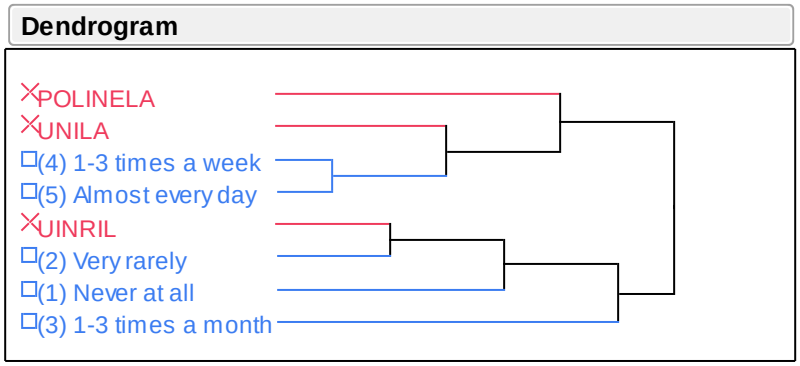


Figure 5.14 Cluster correspondence analysis of university and return frequency after 7 p.m.

Figure 5.15 shows that the majority of students walk in campus areas with moderate intensity. Students at POLINELA are very much a walking population. Meanwhile, the frequency distribution for moderate intensity tends to be evenly distributed over all campuses, i.e., UNILA (25%), UINRIL (25%), and POLINELA (24%). Thus, students at all three universities have a similar trend with respect to the culture of walking on campus sidewalks.

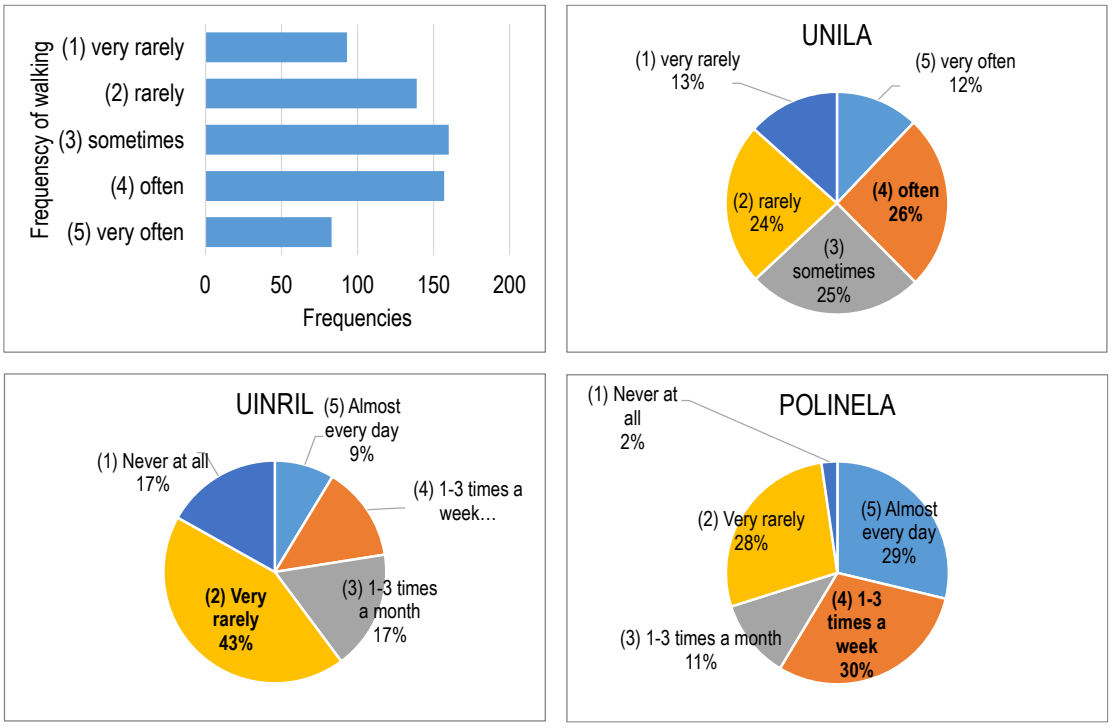


Figure 5.15 Distribution of walking frequency

The cluster correspondence analysis in Figure 5.16 shows students' habitual patterns of walking frequency through proximity relationships. Although the three campuses have similar trends in their culture, this correspondence analysis reinbatches the relationship between POLINELA students with the most often frequencies and the relationship between UNILA and UINRIL students with frequent walking frequencies.

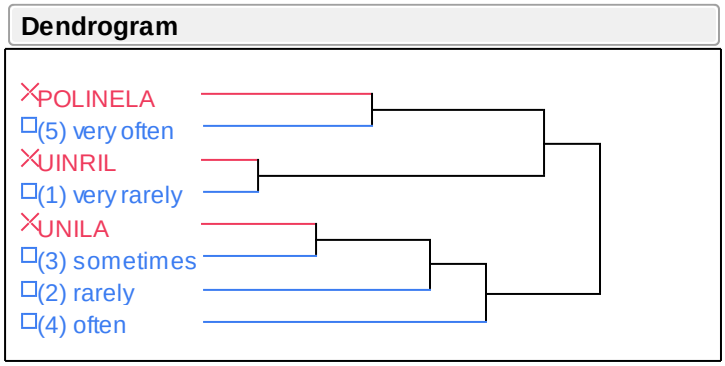


Figure 5.16 Cluster correspondence analysis of university and frequency of walking on campus sidewalk

Figure 5.17 shows the majority of students walking on sidewalk for less than 15 minutes per day (most dominant) and 15-30 minutes (second most dominant). It shows UNILA and POLINELA students being most closely related to walking duration variables <15 minutes. The patterns that occur on all campuses tend to be the same, i.e., dominant in duration <15 minutes by 63% (UNILA), 54% (UINRIL), and 66% (POLINELA). The second most dominant duration that occurred on the three campuses also tended to be the same, i.e., 25% (UNILA), 35% (UINRIL), and 28% (POLINELA). This means that the duration of walking for UINRIL students tends to be longer than for other students (Figure 5.18). This condition is caused by the public transport mode factor being most dominant for UINRIL students which also affects the duration of their walk.

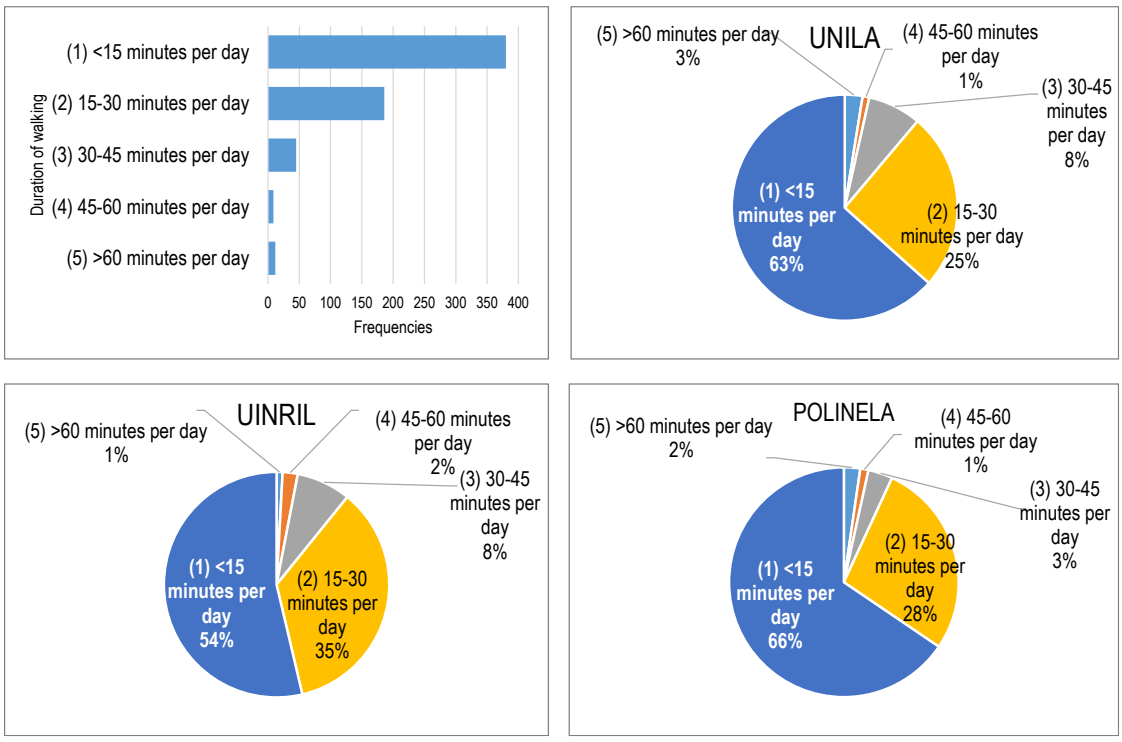


Figure 5.17 Distribution of walking duration on campus

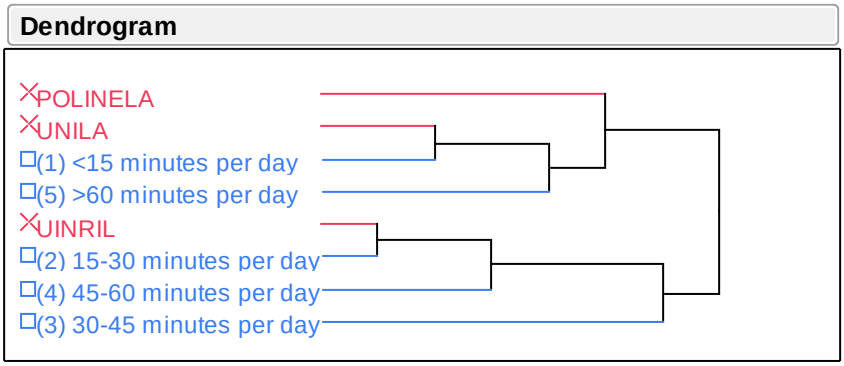


Figure 5.18 Cluster correspondence analysis of university and duration of walking on campus sidewalk

Based on the above description, the population engages in moderate activity (5–7 hours per day). The duration of activity is influenced by the participation in the organization and the campus lecture system. In addition, the duration of student activity also has an influence on the return frequency after 7 p.m. As for walking frequency, the populations of all campuses have a walking culture that tends to be the same, i.e., less than 15 minutes per day.

Table 5.2 Activity correspondence

Profile	Activity category	University
Duration of Activity (A1)	>9 hours	POLINELA*
	7-9 hours	UNILA
	5-7 hours	UINRIL
	3-5 hours	
	<3 hours	
Return frequency over 7pm (A2)	Very rarely	UINRIL*
	1-3 times per week	UNILA, POLINELA
	Almost every day	
	Never at all	
	1-3 times per month	
Walking frequency (A3)	Very rarely	UINRIL*
	Sometimes	UNILA
	Very often	POLINELA
	Rarely	
	Often	
Walking duration (A4)	<15 minute per day	UNILA*, POLINELA
	>60 minutes	
	15-30 minutes	UINRIL
	45-60 minutes	
	30-45 minutes	

*) first correspondence

Table 5.2 shows the recapitulation of student activity analysis on each campus. UNILA students have proximity relationship level one only with category less than 15 minutes (walking duration).

Meanwhile, other proximity relationships are category 7-9 hours per day (duration activity), 1-3 times per day (return frequency over 7pm), and sometimes (walking frequency).

UINRIL students have a close relationship level one with the category very rarely (return frequency over 7pm), and very rarely (walking frequency). Other proximity relationships in UINRIL students are category 5-7 hours (duration activity) and 15-30 minutes (walking duration).

POLINELA students have a proximity relationship level only with the category more than 9 hours (duration activity). Meanwhile, the other proximity relationship is in the category 1-3 times per week (return frequency over 7pm), very frequent (walking frequency), less than 15 minutes per day (walking duration).

5.3 Correspondence analysis of student profile component and other student profile components

Correspondence analysis using clusters was done on a profile component with other profile components to make it easier to understand the relationship between variables. The number of cluster analyses resulting from this relationship were six: P1 and P2, P1 and P3, P1 and P4, P2 and P3, P2 and P4, and P3 and P4 (Figure 5.19). Cluster analysis shows the relationship between variables. The shorter the line that connects the variables the closer the relationship between the two.

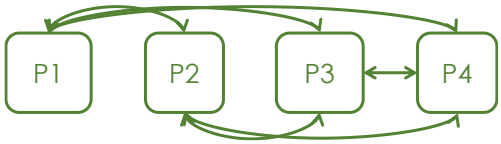


Figure 5.19 Connectivity between student profiles

Figure 5.20 (a) shows the relationship of proximity between the gender profile and the overall batch. The male student relationship is closer to the batch of 2017. Meanwhile, female students are closer to the 2015 class. Figure 5.20 (b) shows the relationship between gender and the mode of transportation. Females tend to be close to walking, cars, and public transport while the male is closer to the bicycle mode (10) and motorcycles (371). This is due to motorcycle use being more frequent among male students than female students.

Figure 5.20 (c) shows the relationship between gender and organizational participation. Female students have a closer relationship to the participation variable of yes (not active), while male students tend to be very active in organizations. This means there is a greater number of male students for participation in the organization.

Figure 5.20 (d) shows the relationship between batch and mode of transport. Students of the class of 2014 and earlier had a close relationship with the public transport mode and motorcycles. This is because the student class of 2014 and earlier tends to require fast mobility while some others did not have alternative vehicle other than public transport. The walking mode has the closest connection with the batches of 2017 and 2016. This means that the new generation tends not to have alternative modes

transportation other than walking. Cars as the mode of transportation is more closely related to the batch of 2015. This is due to many respondents from the class of 2015 coming from upper-middle families in economic terms compared to other batches.

Figure 5.20 (e) shows the relationship between student participation and student batch. The closest relationship is seen in the relationship between the batch of 2014 and earlier with the inactive variable. This is because the students of the class of 2014 and earlier are students who are focused on completing their studies. Thus, participation in organizations is not their priority.

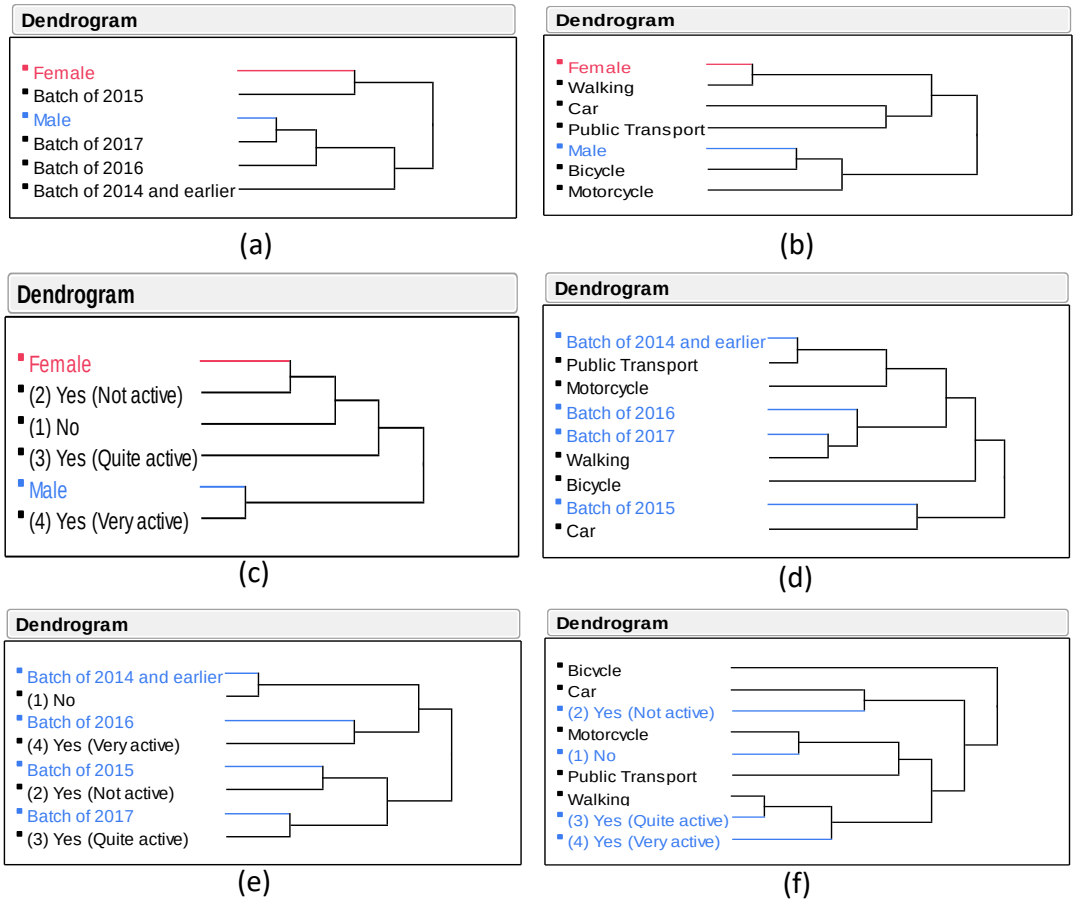


Figure 5.20 Cluster analysis by cluster inter profile

The next close relationship includes the 2017 batch profile with yes (quite active), the 2015 batch with yes (not active), and the 2016 batch with yes-very active variables. Student variables from 2017 have a close relationship with the yes-quite active variable because they are interested in following the organization as a new thing in higher education. Meanwhile, students from 2016 have a close relationship with the variable yes (active) because the batch is a generation of organizational managers. Students from 2015 are students who are close to the yes (not active) profile because they are still organized but are at the steering committee level. Thus, this condition forms an inverted v curve pattern with 2016 batch as its peak.

Figure 5.20 (f) shows the relationship between transportation modes and student participants. This is the closest relationship between the walking variable and the yes (very active) variable. This is in accordance with Figure 5.27 of student-student connectivity which indicates that students from 2016 and 2017 are closely associated with walking modes and Figure 5.28 (e) which shows that students of the 2016 and 2017 classes are the most actively organized students.

Based on the above description, male and female students have different tendencies toward transportation mode variables and organizational activities. Female students have close relationships with the walking mode (dominant), cars, and public transport, whereas male students tend to be dominant in using the motorcycle mode. In the variable of organization participation, a cluster diagram shows that male students are more active in organizations than female students.

In addition, the two newest student batches (2016 and 2017) have the same tendency to use the walking mode of transportation and participate in student organizations actively. That is, the walking mode of transportation has a close relationship with student participation in student organizations. Meanwhile, student activity patterns tend to form a reversed v curve with 2016batch as the peak.

Table 5.3 Cluster correspondence connectivity between student profiles

	F	M	B17	B16	B15	B14	MC	W	PT	C	BC	NP	PNA	PQA	PVA
F															
M															
2017		●													
2016		○													
2015	●														
2014															
MC		○				○									
W	●		●	●											
PT						●									
C	○				●										
BC		●													
NP	○					●	●		○						
PNA	●				●					●					
PQA			●					●							
PVA		●		●				○							

● First correspondence

○ Second correspondence

Note: F: female; m: Male; B17: Batch 2017; B16: Batch 2016; B15: Batch 2015; B14: Batch 2014 and earlier; MC: motor cycle; W: walking; PT: public transport; C: car; BC: bicycle; NP: no participation; PNA: participation-not active; PQA: participation-quite active; PVA: participation-very active

5.4 Correspondence Analysis of Student Profile and Activity

This section is a correlation analysis using clusters between each student profile: gender (P1), batch (P2), modes of transport (P3), and participation in organizations (P4) on all student gender activities (P1), batch (P2), transportation mode (P3), and participation in organizations (P4) (Figure 5.21). Correspondent analysis is performed on each component of the profile for all components of the activity. Each of the drawings in this section has four correspondence analysis drawings including the correspondence analysis of all campuses (a), UNILA campus (b), UINRIL (c), and POLINELA (d).

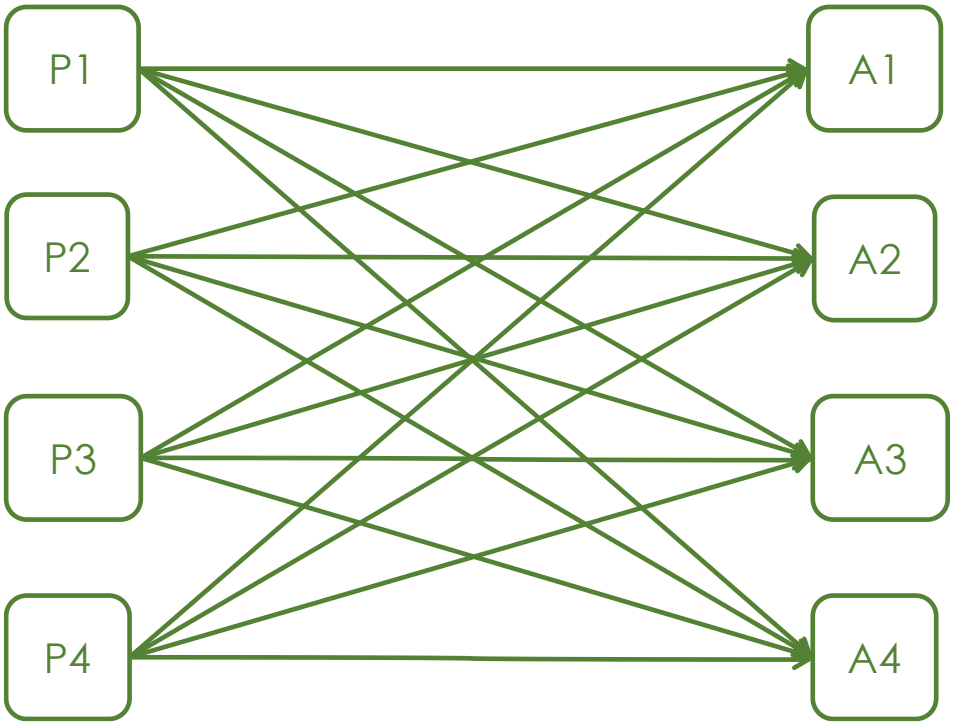


Figure 5.21 Connectivity between profile and student activity

5.4.1 Correspondence Analysis of Gender and Student Activity

Figure 5.22 (a) shows the relationship between gender and duration of student activity. On campus as a whole, female students tend to have a close relationship with an activity duration variable of more than 9 hours, while male students tend to have a close relationship with a duration of activity of 3–5 hours. This means that the activities of female students on campus are longer than those of male students. This condition is influenced by female students of POLINELA who have a close relationship with an activity duration more than 9 hours while female students of UNILA and UINRIL tend to have only 7–9 hours. Among male students, UINRIL students have the shortest time compared to other campus (<3 hours), students at UNILA (3–5 hours) and POLINELA students (7–9 hours). Thus, POLINELA students are students who move longer than students at all other campuses and among both genders.

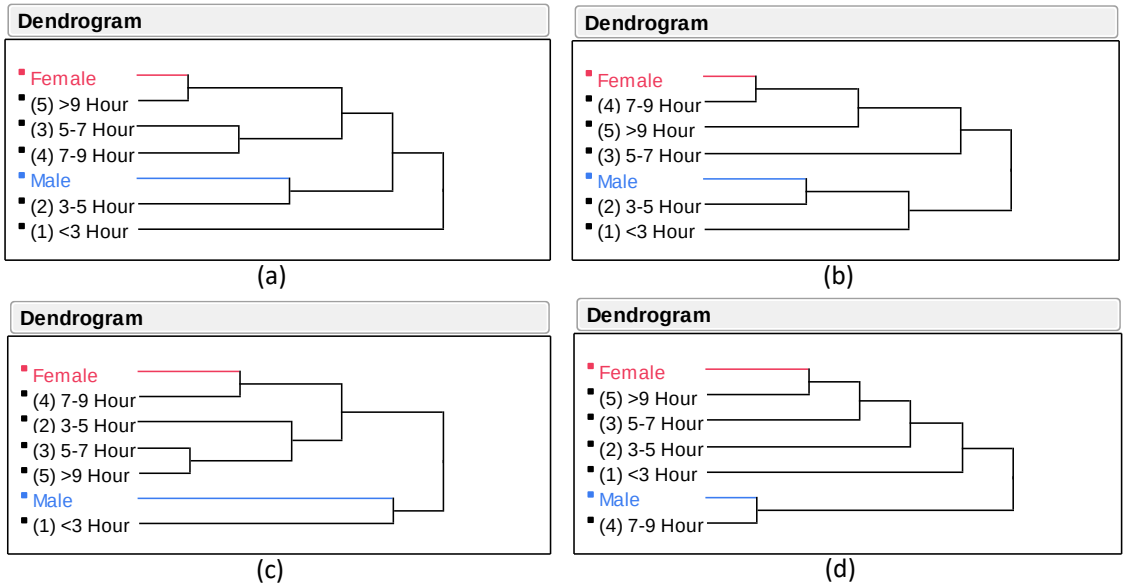


Figure 5.22 Correspondence analysis by cluster between gender and activity duration

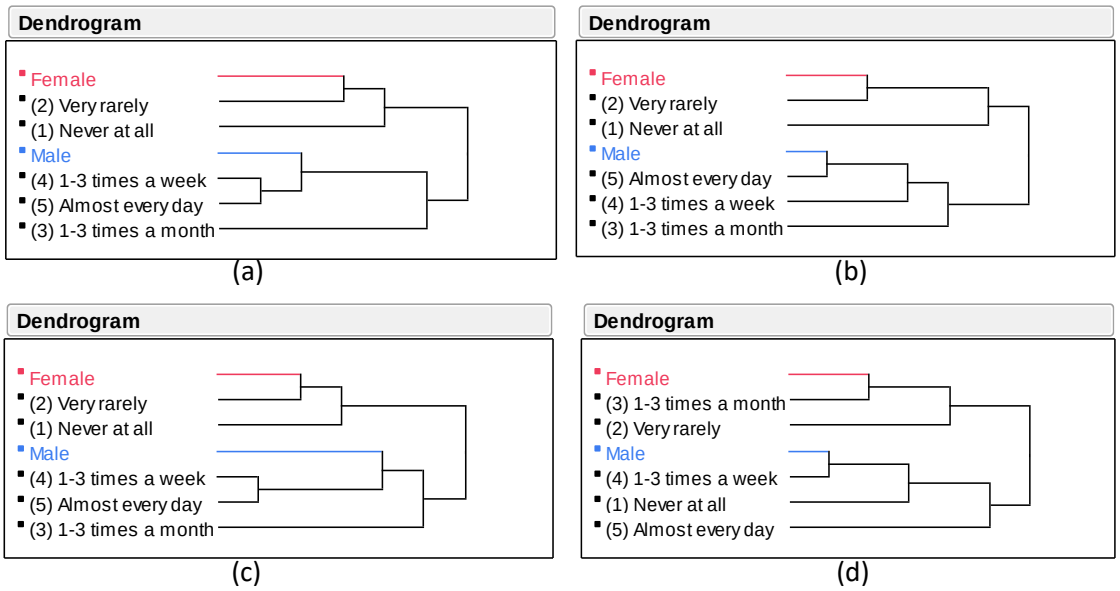


Figure 5.23 Correspondence analysis by cluster between gender and return frequency after 7 p.m.

Figure 5.23 shows the proximity relationship between gender variables and return frequency after 7 p.m. Overall, male students go home more often than female students do. This is due to the religious and psychological norms that cause females not to want to go home at night. Female students of POLINELA, however, have a different tendency than female students at other campuses who tend to have more frequent night returns home (1–3 times a month). Male students at UNILA are students who more often come home nightly than those at other campuses (almost every day). Male students on other campuses return home nightly with a frequency of 1–3 times per week. This means that UNILA male students have a variety of additional activities other than being active in organizations.

Figure 5.24 shows the relationship between gender and walking frequency. Overall, third-year college students tend to have fewer frequencies for walking on campus. This is unlike UNILA students (male and female) who tend to be more active in walking. This means that UNILA students tend to engage in various activities throughout the campus environment.

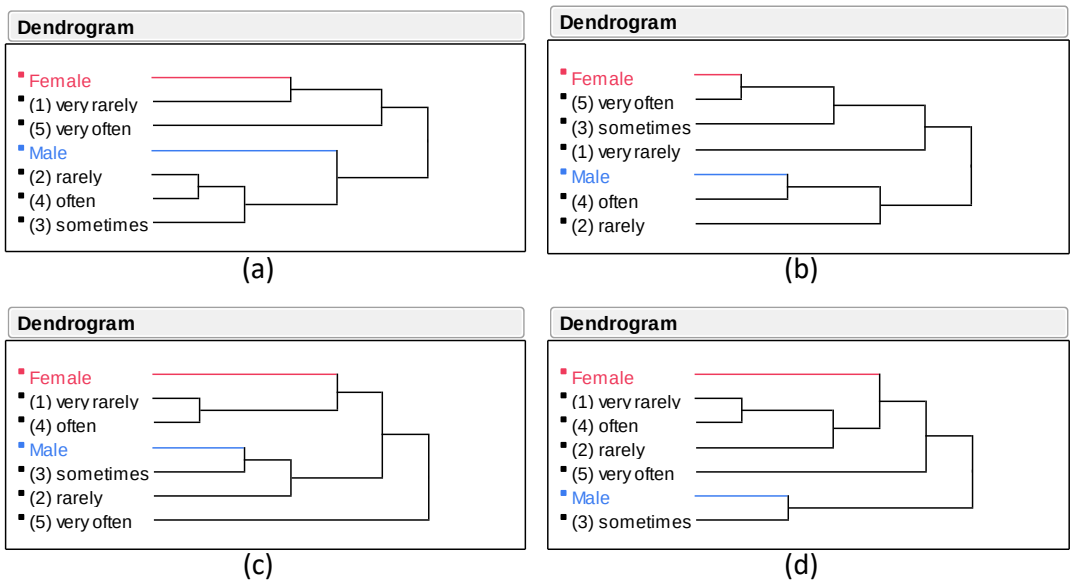


Figure 5.24 Correspondence analysis by cluster between gender and walking frequency

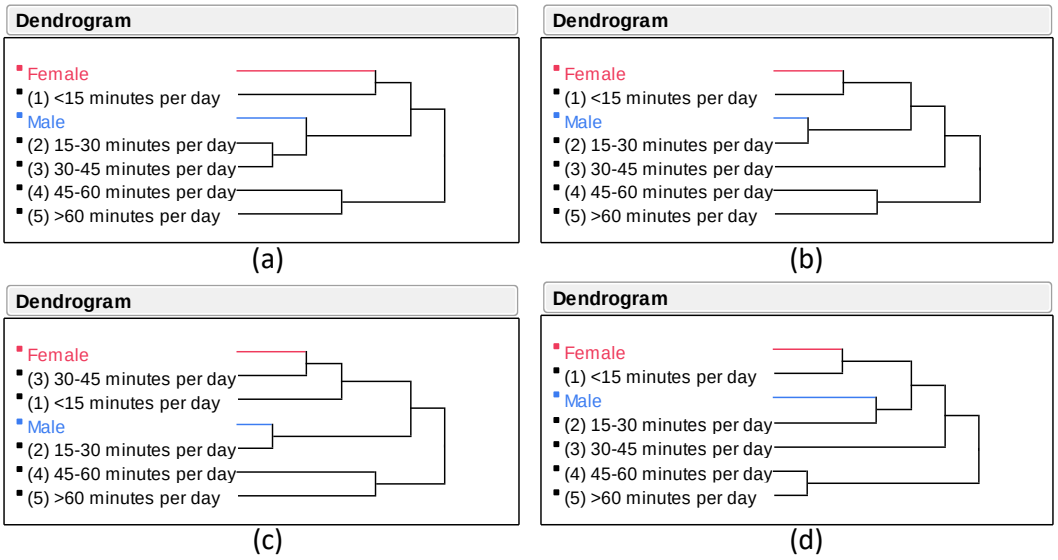


Figure 5.25 Correspondence analysis by cluster between gender and walking duration

Figure 5.25 shows the close relationship between gender and duration of student walking. Overall, male students walk longer than female students. This happens on all campuses except the UINRIL campus. On the UINRIL campus, female students run longer than male students do. This is

due to the majority of female UINRIL students using walking as their mode of transportation. That is, the mode of transportation affects the walking frequency of UINRIL female students.

Based on the above description, the correspondence between gender profiles on student activity indicates that female students stay longer on campus. This is, however, inversely related to frequency returns which indicate that male students often return home after more than 7 hours. This is because male students have additional activities beyond organizational activities. In addition, overall, college students tend to have less frequent walking frequencies. Male students, however, continue to walk longer than female students do.

Table 5.4 Correspondence of gender (P1) and all student activity

1-Table Gender (P1) and duration of student activity (A1)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Female	>9 hours	7-9 hours	7-9 hours	>9 hours
Male	3-5 hours	3-5 hours	<3 hours	7-9 hours
2-Table Gender (P1) and return frequency over 7 pm (A2)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Female	Very rarely	Very rarely	Very rarely	1-3 per month
Male	1-3 per week	Almost every day	1-3 per week	1-3 per week
3-Gender (P1) and walking frequency (A3)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Female	Very rarely	Very often	Very rarely	Very rarely
Male	Rarely	Often	sometimes	sometimes
4-Gender (P1) and walking duration (A4)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Female	<15 minutes	<15 minutes	30-45 minutes	<15 minutes
Male	15-30 minutes	15-30 minutes	15-30 minutes	15-30 minutes

5.4.2 Correspondence Analysis of Student Batch and Student Activity

Figure 5.26 shows the close relationship between student batch and the duration of student activity. Students of the 2016 batch tend to move for the longest time compared to the other batches. This is supported by the tendency of the same duration of activity on the UINRIL and POLINELA campuses. While on the UNILA campus, the 2015 student batch (>9 hours) compared to the students from 2016 (7–9 hours). This still means, however, that the trend of the class of 2016 is to move for longer than the other batches.

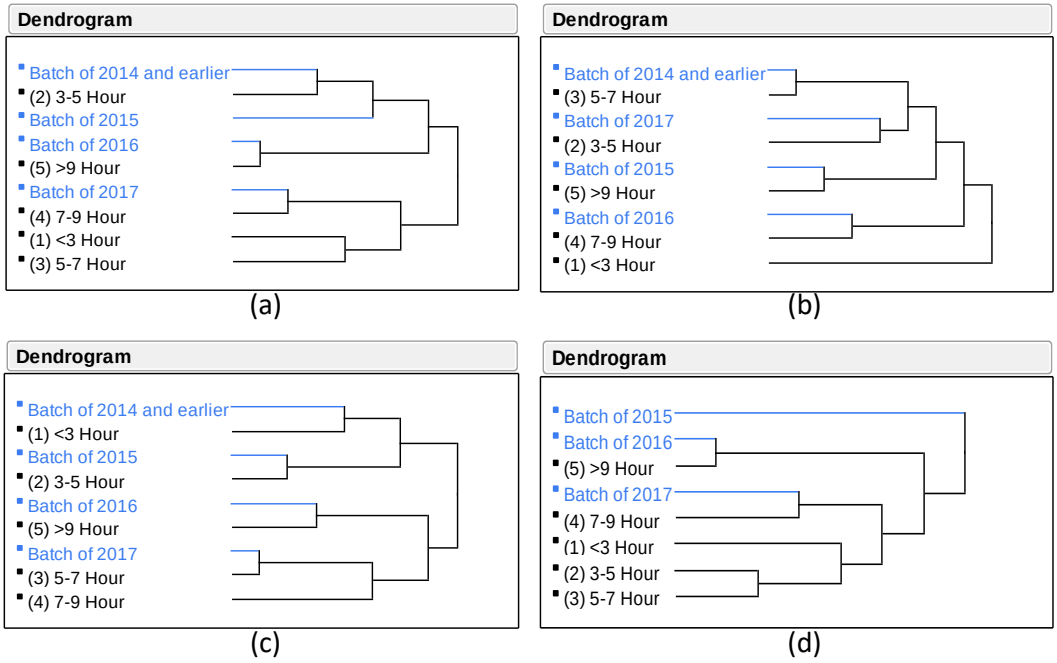


Figure 5.26 Correspondence analysis by cluster between student batch and duration of activity

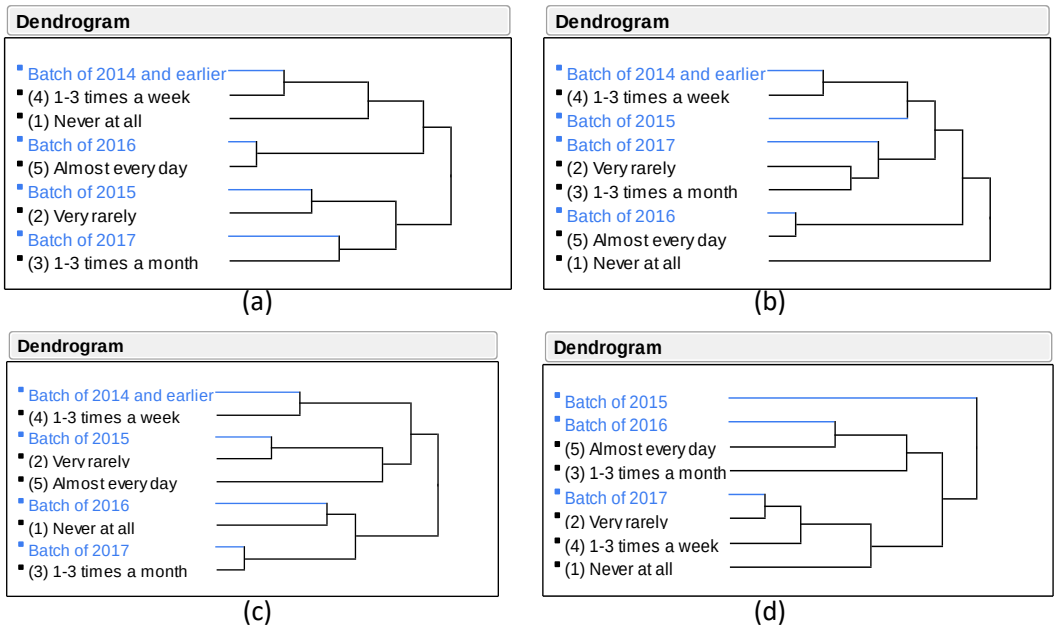


Figure 5.27 Correspondence analysis by cluster between student batch and return frequency after 7 p.m.

Figure 5.27 shows the proximity relationship between student batch and return frequency after 7 p.m. Overall, the generation of 2016 is the generation that most often come home at night (almost every day) and for the batch 2014 and earlier it tends to be rarely and never at all. On the UINRIL campus, however, the batch of 2016 tends to never go home at all. This means that even though the UINRIL

students of the class of 2016 have the longest activity duration on campus (see Figure 5.34), they tend to be consistent in returning home no later than 7 p.m.

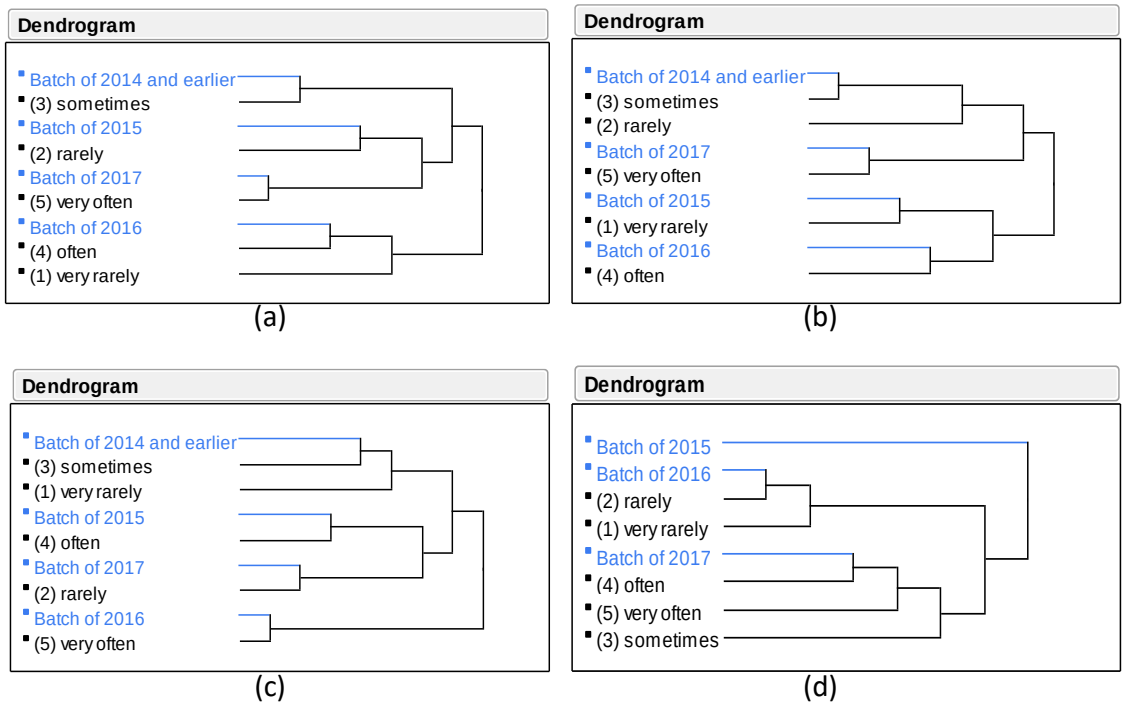


Figure 5.28 Correspondence analysis by cluster between student batch and walking frequency

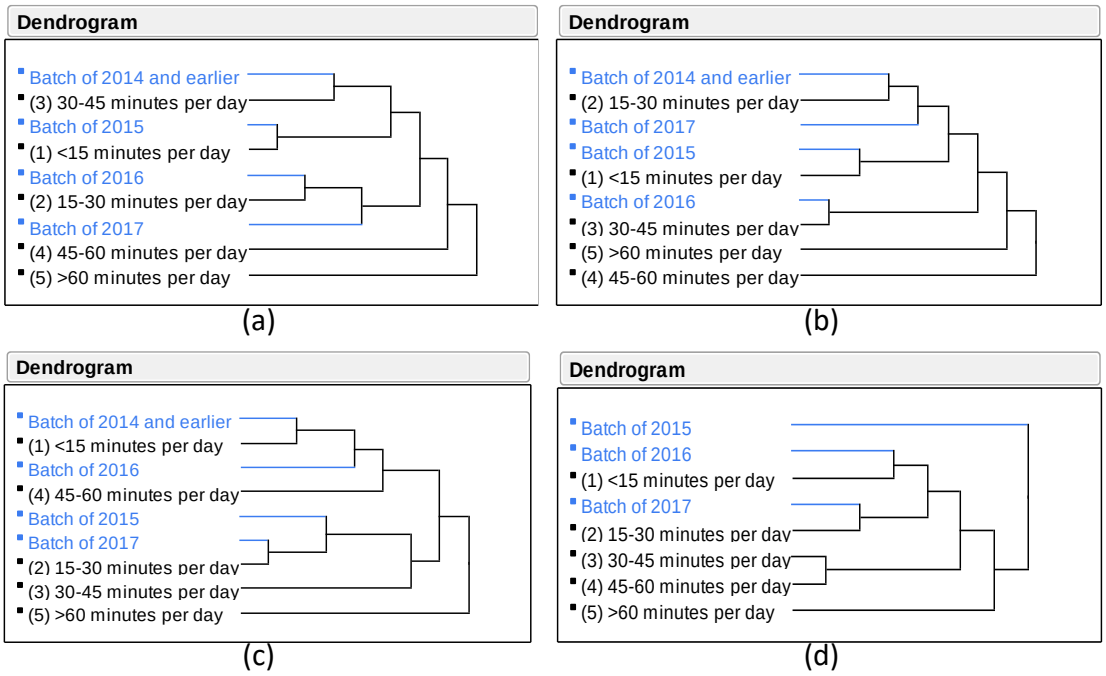


Figure 5.29 Correspondence analysis by cluster between student batch and walking duration

Figure 5.28 shows the close relationship between student batch and walking frequency. In total, the 2017batch is the one that most often runs on campus. This is due to the generation of 2017 being the most junior students who tend not to have vehicles. However, this tendency applies differently to the UINRIL student batch of 2017. This is because the majority of students of the class of 2017 at UINRIL move the most compared to students at other campuses.

Table 5.5 Table correspondence of batch (P2) and all student activity

1-Batch (P2) and duration of student activity (A1)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Batch 2017	7-9 hours	3-5 hours	5-7 hours	7-9 hours
Batch 2016	>9 hours	7-9 hours	>9 hours	>9 hours
Batch 2015	3-5 hours	>9 hours	3-5 hours	<3 hours
Batch 2014	3-5 hours	5-7 hours	<3 hours	
2-Batch (P2) and return frequency over 7pm (A2)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Batch 2017	1-3 per month	Very rarely	1-3 per month	Very rarely
Batch 2016	Everyday	Everyday	Never	Everyday
Batch 2015	Very rarely	1-3 per week	Very rarely	Almost every day
Batch 2014	1-3 per week	1-3 per week	1-3 per week	
3-Batch (P2) and walking frequency (A3)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Batch 2017	Very often	Very often	Rarely	Often
Batch 2016	Often	Often	Very often	Rarely
Batch 2015	Rarely	Very rarely	Often	often
Batch 2014	sometimes	sometimes	sometimes	
4-Batch (P2) and walking duration (A4)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Batch 2017	15-30 minutes	15-30 minutes	15-30 minutes*	15-30 minutes
Batch 2016	15-30 minutes*	30-45 minutes	<15 minutes	<15 minutes*
Batch 2015	<15 minutes	<15 minutes	15-30 minutes	<15 minutes
Batch 2014	30-45 minutes	15-30 minutes*	<15 minutes*	

Figure 5.29 shows the close relationship between student batch and student walking duration. Overall, the student of class of 2014 has the longest running students (30–45 mins.) and the batch of 2015 runs for the shortest time. But on these three campuses, each campus has a different proximity relationship between a batch with the duration of student walking. Based on the above description, the proximity relationship between student batch and student activity shows that student of batch of 2016 exhibits a longer duration of activity than other students of a given class. This causes the generation

to have the highest frequency of coming home. In contrast, the students of batch 2014 exhibit the shortest duration of activity. Each campus, however, exhibits a tendency that is different in the duration of student activity.

Another analysis shows that the student class of 2017 consists of students who most often walk on the sidewalk, even though this does not happen on all campuses. The class of 2014 and earlier has the longest running students and 2015 has the shortest. Each campus has a different tendency with respect to the relationship of proximity that occurs, however, so the dominance of the batch is not overly visible in the activity variable.

5.4.3 Correspondence Analysis of Participation in Student Organizations and Student Activity

Figure 5.30 shows the close relationship between participation in student organizations and the duration of student activity. Overall, students who participate in the most active organizations are the longest-serving students on campus. This means that participation in the organization has a strong proximity to the duration of activity on campus.

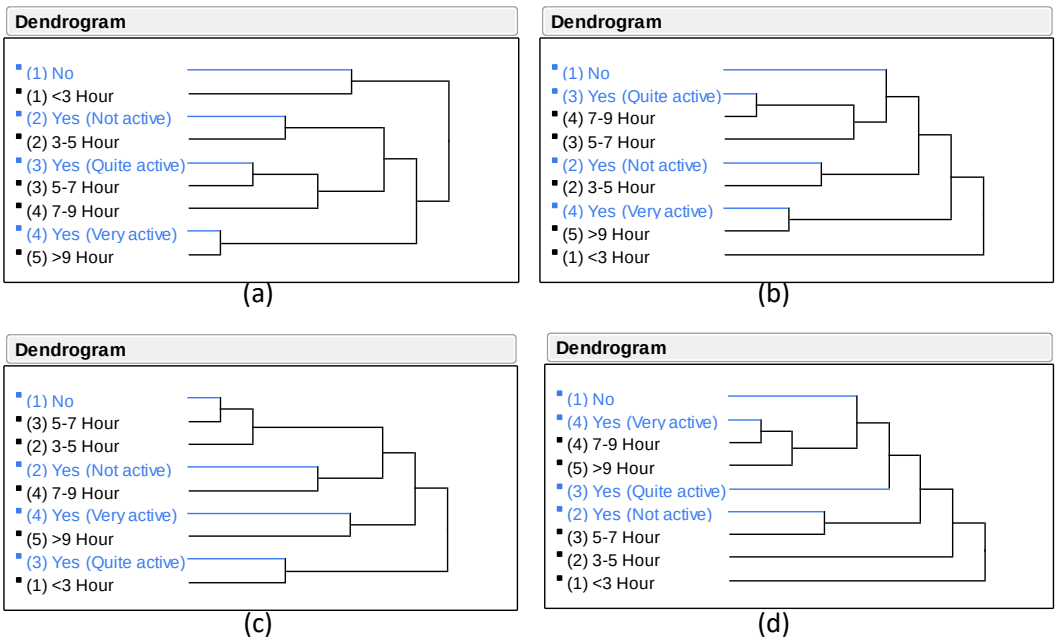


Figure 5.30 Correspondence analysis by cluster between student participation in organizations and students' daily activity

Figure 5.31 shows the close relationship between participation in student organizations and return frequency after 7 p.m. Overall, highly active college students tend to come home late at night after 7 p.m. almost daily. But for UINRIL students, the frequency to go home night 1-3 times a week more shows a closer relationship than almost every day. This means that only a small portion of UINRIL's students are very actively organizing home almost every night.

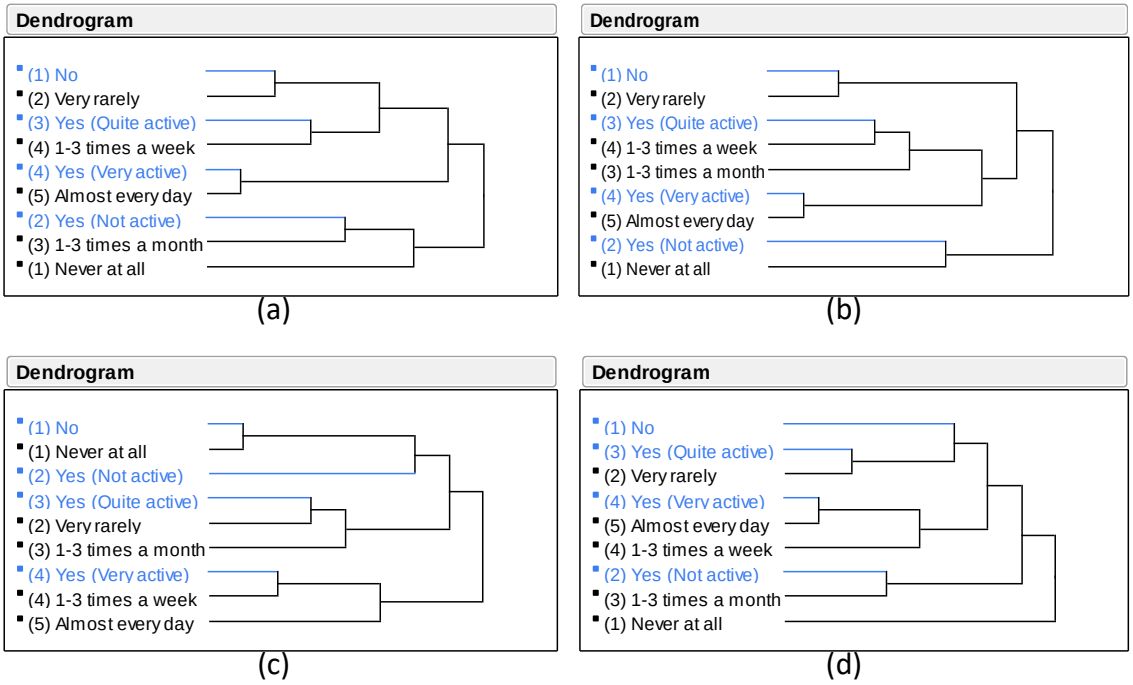


Figure 5.31 Correspondence analysis by cluster between participation in student organizations and return frequency after 7 p.m.

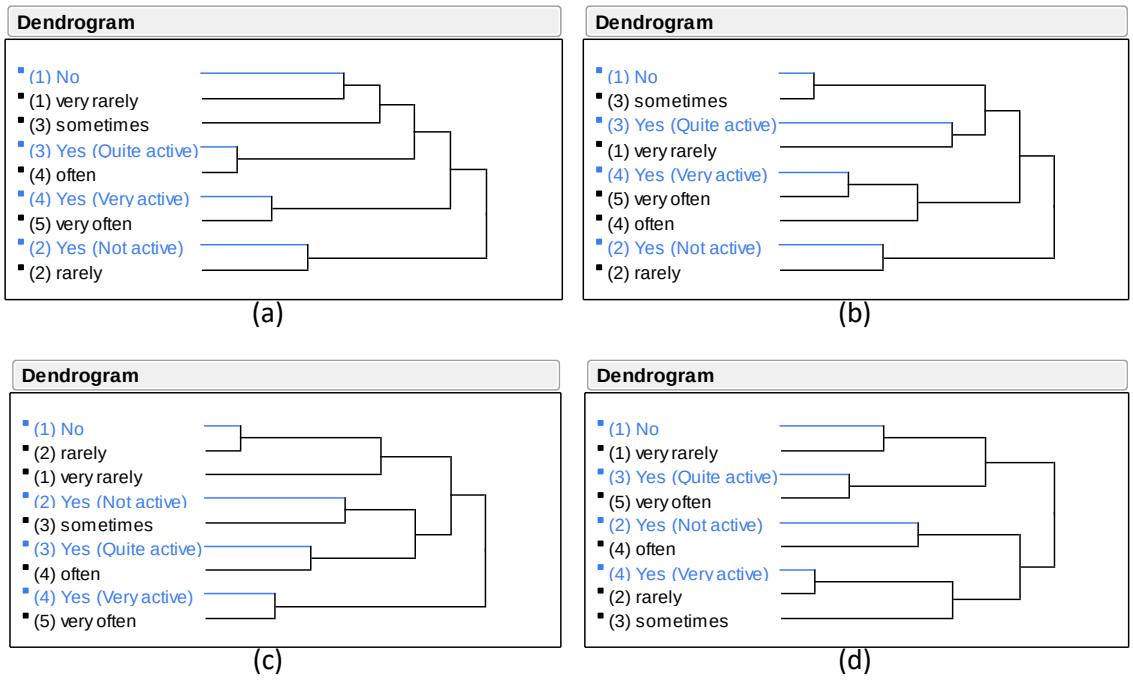


Figure 5.32 Correspondence analysis by cluster between participation in student organizations and walking frequency on campus

Figure 5.32 shows the close relationship between participation in student organizations and walking frequency. Overall, students who are very active in organizations are those who are very

frequently walking on campus. This means that the people who are actively involved in organizations are consistently running as their main mode of transportation around the campus.

Figure 5.33 shows the close relationship between participation in student organizations and walking duration. Overall, students who did not participate in student organizations and those who were active in the organization had a walking duration of less than 15 minutes. However, closer relationships to unorganized variables are discernible. Unlike UNILA students, active students actually run for less than 15 minutes. This means that UNILA students who are active in organizations tend to mobilize via their chosen modes of transportation. While on the Polytechnic campus, both students involved in organizations and those who aren't tend to have a walking duration of less than 15 minutes. That is, involvement, or not, in organizations does not affect the Polytechnic students' walking duration on campus.

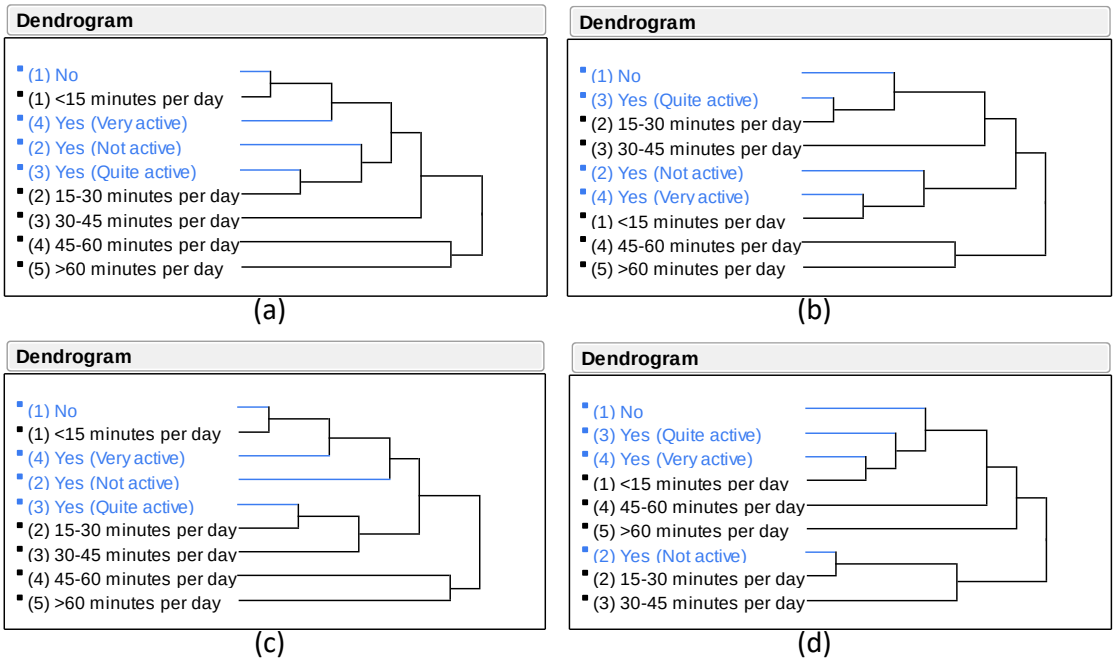


Figure 5.33 Correspondence analysis by cluster between participation in student organizations and walking duration on campus

Based on the above description, the correspondence between the participation profile of the student organization on student activity indicates that the students who actively participate in organizations are students who have more activities on campus. This also affects their tendency to return home at 7 p.m. In addition, they also tend to walk on campus consistently. For student activity duration, highly active and non-participating students consistently walk for less than 15 minutes.

Table 5.6 Table correspondence of participation on student organization (P3) and all student activity

1-Participation on student organization (P3) and duration of student activity (A1)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
No Participation	<3 hours	7-9 hours	5-7 hours	7-9 hours
Yes (Not active)	3-5 hours	3-5 hours	7-9 hours	5-7 hours
Yes (Quite active)	5-7 hours	7-9 hours	<3 hours	>9 hours
Yes (Very active)	>9 hours	>9 hours	>9 hours	7-9 hours
2-Participation on student organization (P3) and return frequency over 7pm (A2)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
No Participation	very rarely	very rarely	Never	very rarely
Yes (Not active)	1-3 per month	never	Never	1-3 per week
Yes (Quite active)	1-3 per week	1-3 per week	very rarely	very rarely
Yes (Very active)	Almost every day	Almost every day	1-3 per week	Almost every day
3-Participation on student organization (P3) and walking frequency (A3)				
Place / Category	All Campus	Unila	Uinril	Polinela
No Participation	Very rarely	Sometimes	Rarely	Very rarely
Yes (Not active)	Rarely	Rarely	Sometimes	Often
Yes (Quite active)	Often	Very rarely	Often	Very often
Yes (Very active)	Very often	Very rarely	Very often	Rarely
4-Participation on student organization (P3) and walking duration (A4)				
Place / Category	All Campus	Unila	Uinril	Polinela
No Participation	<15 minutes*	15-30 minutes	<15 minutes*	<15 minutes
Yes (Not active)	15-30 minutes	<15 minutes	<15 minutes	15-30 minutes
Yes (Quite active)	15-30 minutes*	15-30 minutes*	15-30 minutes	<15 minutes
Yes (Very active)	<15 minutes	<15 minutes*	<15 minutes	<15 minutes*

5.4.4 Correspondence Analysis of Transportation Mode and Student Activity

Figure 5.34 shows the close relationship between transportation mode and the duration of student activity. Overall, students with transportation modes walk the longest. This is because they are trying to be efficient in terms of transportation time and cost. Slightly different inclinations are seen for UNILA students, as students who use public transport stay longer on campus than students who walk.

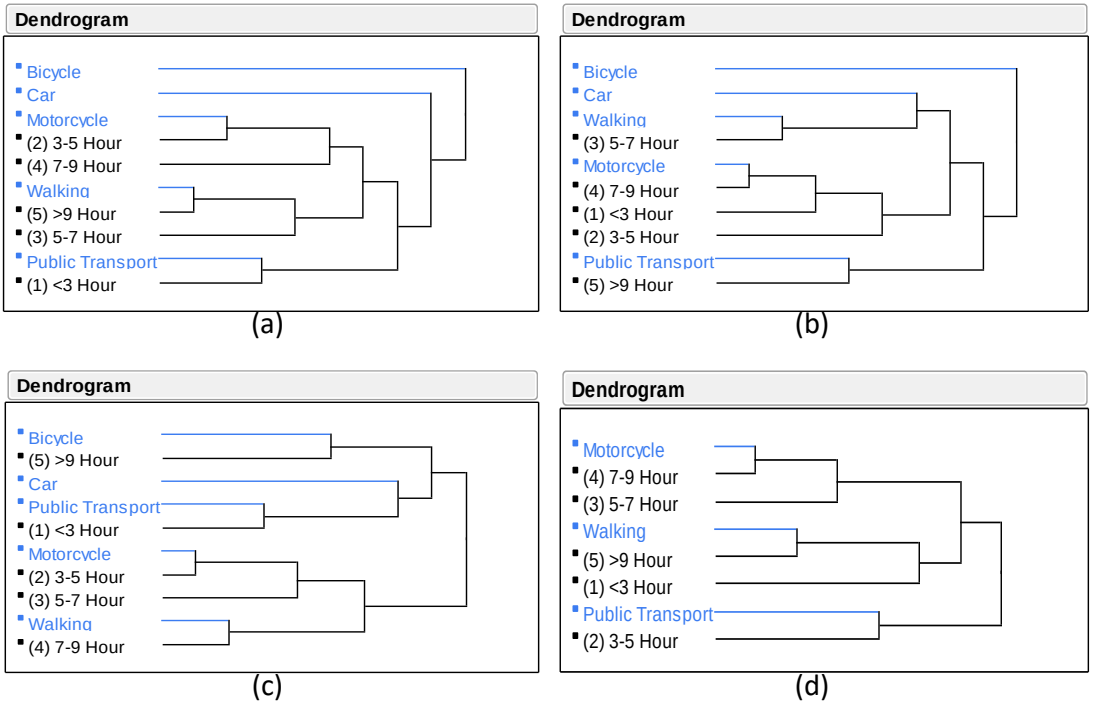


Figure 5.34 Correspondence analysis by cluster between transportation mode and student daily activity on campus

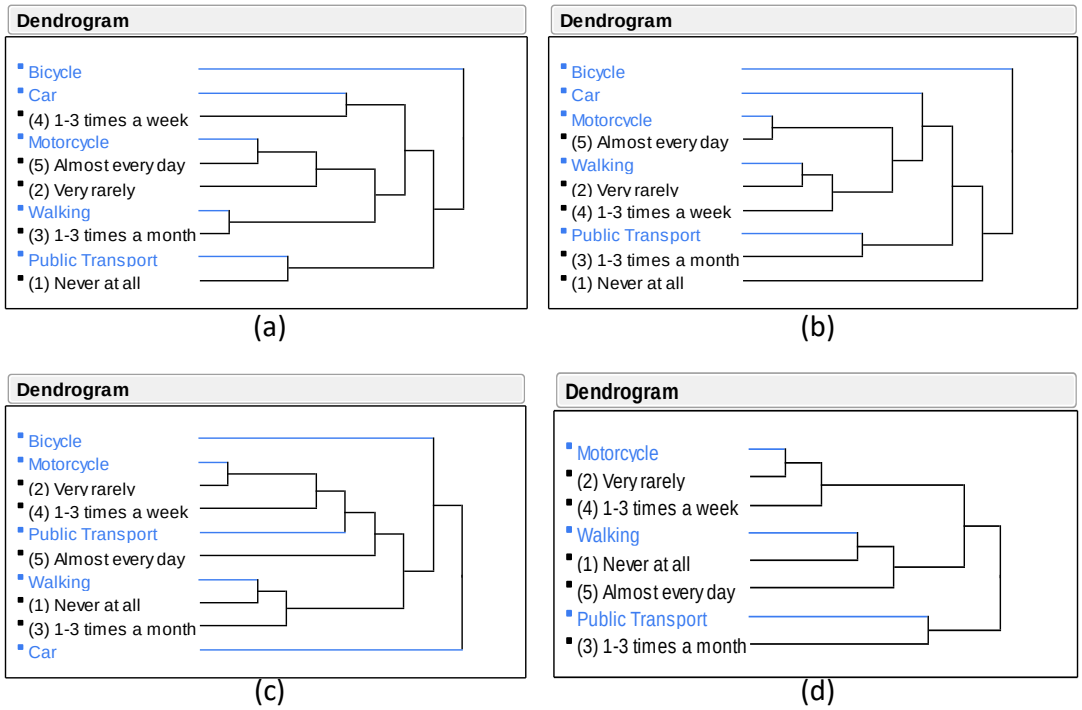


Figure 5.35 Correspondence analysis by cluster between transportation mode and return frequency after 7 p.m.

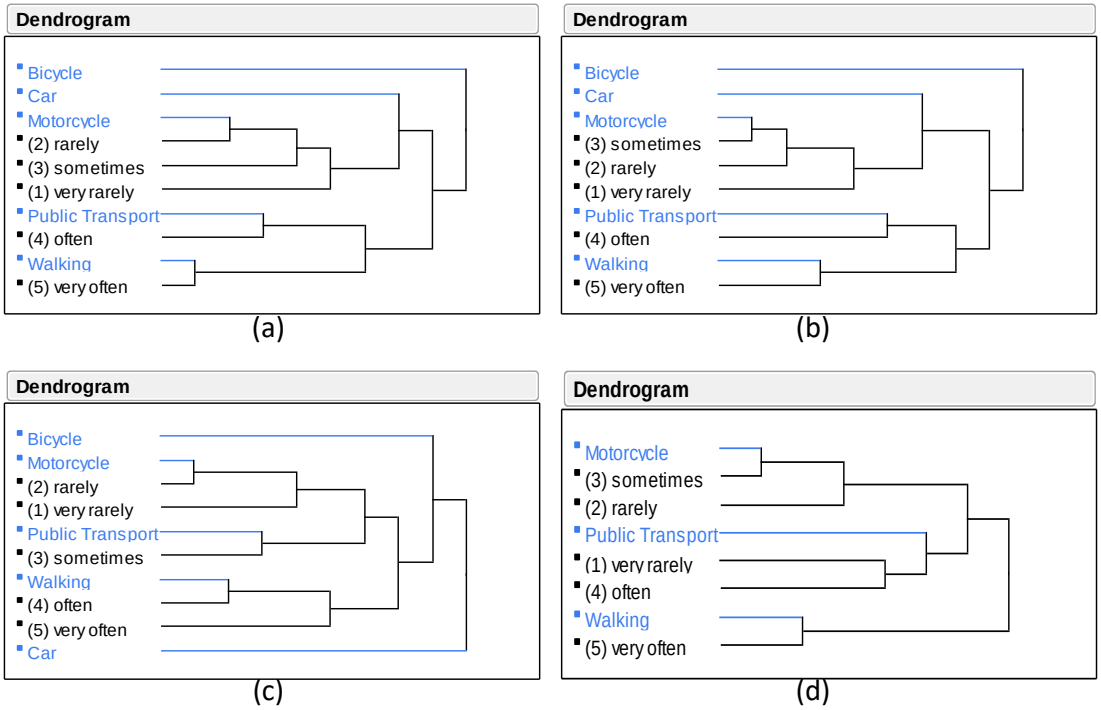


Figure 5.36 Correspondence analysis by cluster between transportation mode and walking frequency on campus

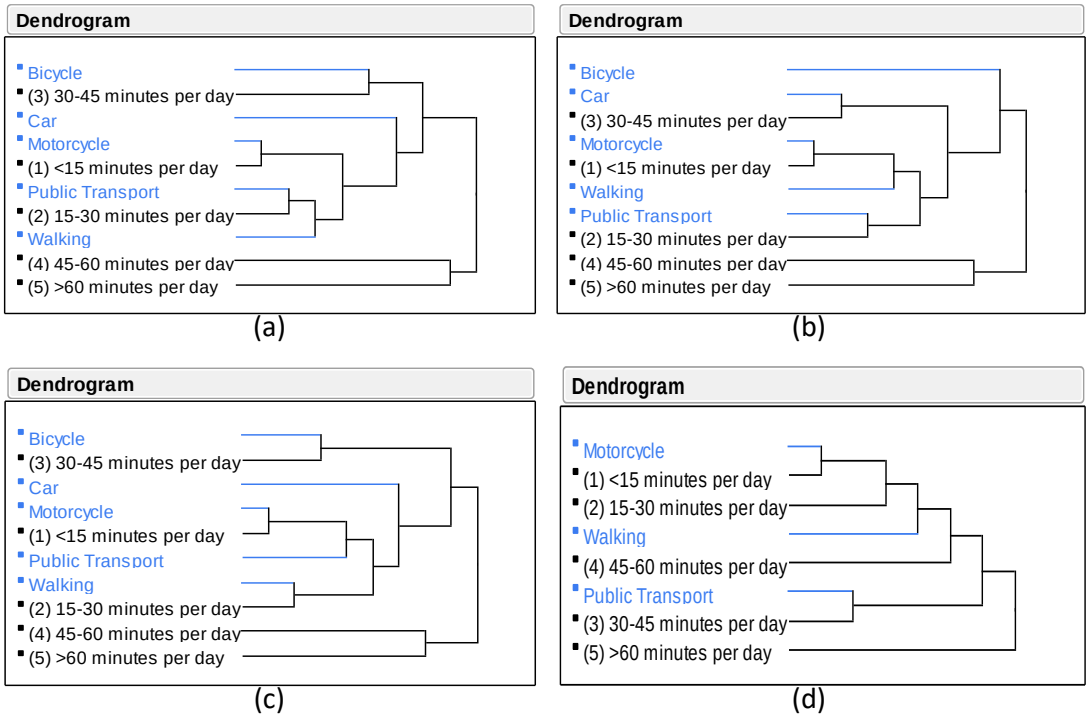


Figure 5.37 Correspondence analysis by cluster between transportation mode and walking duration

Figure 5.35 shows the proximity relationship between transportation mode and 7pm overnight frequency return. Overall, students of motorcycle mode tend to most often go home beyond 7pm. While other campus, motorcycle users rarely go home beyond 7pm. UINRIL and POLINELA students who came home most often were students with public transportation (UINRIL) and walking (POLINELA) modes.

Figure 5.36 shows the proximity relationship between transportation mode and walking frequency. Overall, the most common students are those using walking modes. This is very normal because they have no other option when going to functions in other buildings. This condition tends to occur on all campuses.

Figure 5.37 shows the proximity relationship between the transportation mode and the duration of the student's running. Overall, students who are running <15 minutes are students with motorcycles. This tends to happen throughout the entire campus. Meanwhile, the students who walk the longest tend to be different on each campus. The relationship between the variable duration of walking > 60 minutes with the mode of transportation tends to have an insignificant proximity relationship. Based on the above description, the close relationship between the mode of transportation and student activity shows that the mode of walking corresponds to the longest and most frequent walking activities conducted by the students. This is a natural thing and this condition occurs on all campuses. This mode of transportation is chosen because it is considered the most efficient in terms of time and cost with the result that students often do it.

With regard to other correspondences, students using motorcycles as their mode of transportation have the most frequent return frequency after 7 p.m. This is because the students using this mode are males and for their mobility, they tend to use this mode. The proximity relationship also occurs between the mode of the motorcycle and the shortest running frequency (<15 minutes). This is because students who use motorcycles continue to use their vehicles while moving elsewhere on campus.

Table 5.7 Correspondence of transportation mode (P4) and all student activity

1-Transportation Mode (P4) and duration of student activity (A1)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Motor cycle	3-5 hours*	7-9 hours	3-5 hours	7-9 hours
Walking	>9 hours	5-7 hours*	7-9 hours	>9 hours
Public Transportation	<3 hours	>9 hours	<3 hours*	3-5 hours
Car	3-5 hours	5-7 hours	<3 hours	
Bicycle	3-5 hours	5-7 hours	>9 hours	
2-Transportation Mode (P4) and return frequency over 7pm (A2)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Motor cycle	Almost every day	Almost every day	Very rarely	Very rarely

Walking	1-3 per month*	Very rarely	Never	Never
Public Transportation	Never	1-3 per month	1-3 per week	1-3 per month
Car	1-3 per week	Almost every day	1-3 per month	
Bicycle	1-3 per week	Almost every day	Very rarely	
3-Transportation Mode (P4) and walking frequency (A3)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Motor cycle	Rarely *	Sometimes*	Rarely*	Sometimes
Walking	Very often	Very often	Very often*	Very often
Public Transportation	Sometimes	Often	Sometimes	Very rarely
Car	Very often	Sometimes	Very often	
Bicycle	Rarely	Sometimes	Sometimes	
4-Transportation Mode (P4) and walking duration (A4)				
Place / Category	All Campus	UNILA	UINRIL	POLINELA
Motor cycle	<15 minutes*	<15 minutes*	<15 minutes*	<15 minutes
Walking	15-30 minutes	<15 minutes	15-30 minutes	45-60 minutes
Public Transportation	15-30 minutes*	15-30 minutes	<15 minutes	30-45 minutes
Car	<15 minutes	30-45 minutes*	<15 minutes	
Bicycle	30-45 minutes	30-45 minutes	30-45 minutes	

5.5 Section Conclusions

The study found that the profile of each student tended to vary. This is indicated by the different dominance of each campus on gender variables, batch and organizational participation. While with regard to the mode of transportation variables, student tendencies across campuses tend towards being the same regarding the dominant mode of transportation—motorcycles.

Findings on activity variables indicate that student activity on each campus tends to be different. POLINELA students are students who tend to be more dynamic than those involved in other campuses' activities. Meanwhile, students on the UINRIL campus tend to be the most static. This means that the complexity and scale of the campus does not affect student activity. Influence of dominant student activity resulted from lecture system and student organization activity.

In the correspondences between profiles, this study found that the relationships that occur tend to be irregular. That is, the proximity tendency of a profile with other profiles does not apply linearly. In the correspondence relationship between profile and activity, the study found that profiles that tend to influence student activity are gender, batch, and organizational participation.

Chapter 6. Importance of the Analysis of Student Perceptions on Campus Sidewalks

This chapter contains the dominant factors of the importance of the five dimensions model that occur on the public campus as a whole and the detail of each campus, and the difference in importance level on student profile and student activity.

6.1 Introduction

Evaluation of importance is a measure of the perception of things that are considered important in order to be the main considerations in making decisions. This chapter aims to understand the perception of student interest level on five dimensions variables.

The number of dominant variables is taken from a maximum of 40% of the total variables or looks dominant in each dimension. This criterion is used to achieve consistency in the proportion of the number of dominant factors between the dimensions that have the fewest variables (quality: 4 variables) and the dimensions that have the most variables (amenities: 12 variables).

6.2 Dominant Factors that Are Considered Important by Students

Figure 6.1 shows the distribution of factors in the quality dimension. The dominant factor is periodic maintenance. This factor has the highest average level of importance in the quality dimension (Figure 5.15), so it is considered most important by the students. This means that students want a well-preserved sidewalk with smooth, flat, and clean surface conditions. Other variables with greater interest levels include the durability of path material variable, roughness level of the material surface, and the absence of obstructions.

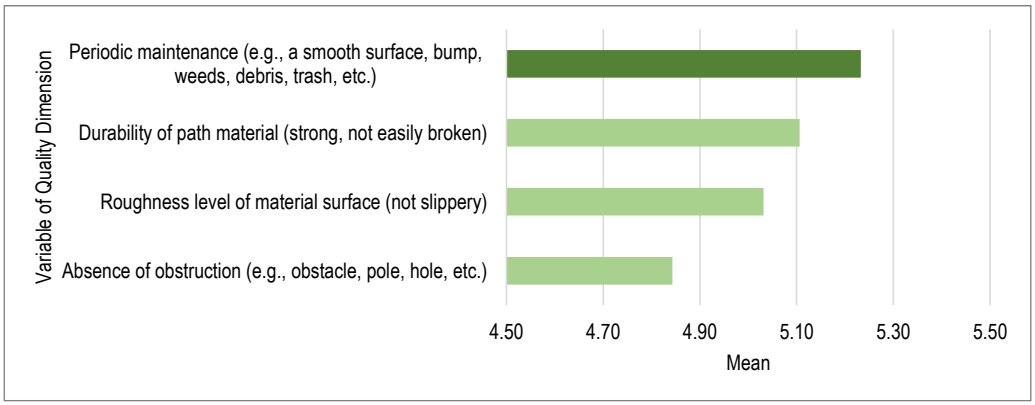


Figure 6.1 Dominant factors of the quality dimension

The order of importance in this quality dimension occurs across all the campuses. That is, students at all campuses have similar perceptions of the importance of the quality dimension. However, each campus has a different level of student interest in a variable. For the most dominant variable, UINRIL students express the highest level of interest compared to other campuses' students. This is due to

sidewalks on UINRIL campus being mostly constructed of materials like grass and dirt roads (photo). Thus, the maintenance of this material needs to be more frequent compared to the treatment of sidewalk with pavement material.

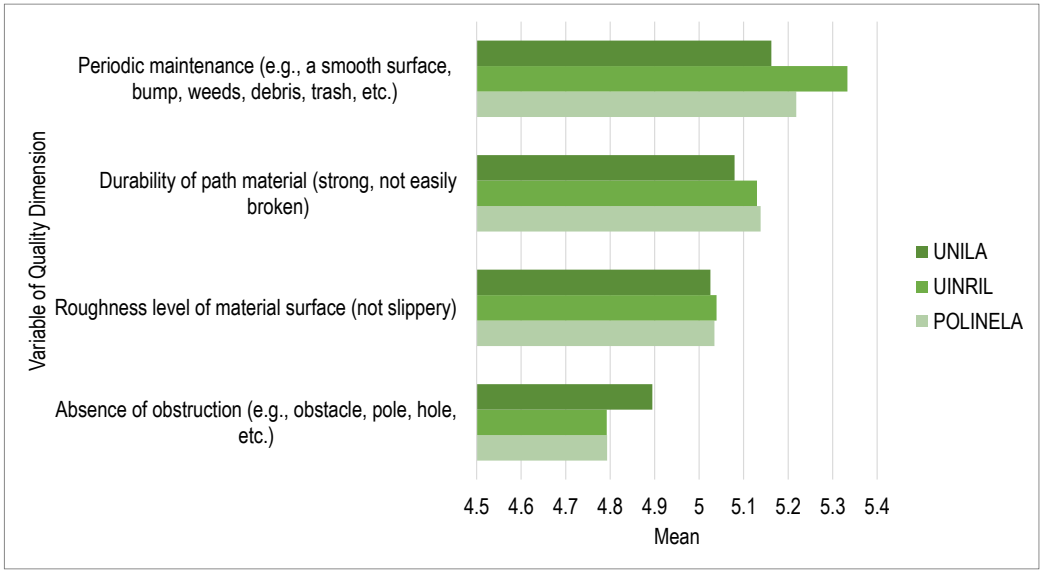


Figure 6.2 Differences in dominant factors of quality dimension on the three campuses

Figure 6.3 shows that the variables of the width of the path and of elevation of the sidewalk higher than the road surface are the highest average factors of importance in regard to the dimension of design. That the width of path variable is one of the foremost variables means that the width of the lane needs to be seriously considered in planning sidewalk. That is, students want a path that is wide. This is because students often walk together with friends. Thus, this has the potential to cause physical contact with other pedestrians especially those traveling in opposite directions.

Students who perceive these variables as being most important come from the UINRIL, UNILA, and POLINELA campuses. UINRIL and POLINELA students considered the width variable most important because their campus sidewalk tend to be mainly narrow. In addition, the misuse of functionality on the lanes as parking vehicles increasingly makes access to the tracks more difficult. While on campus UNILA, although there is a narrow sidewalk, but only on a small scale.

Figure 6.3 Narrow condition of sidewalks

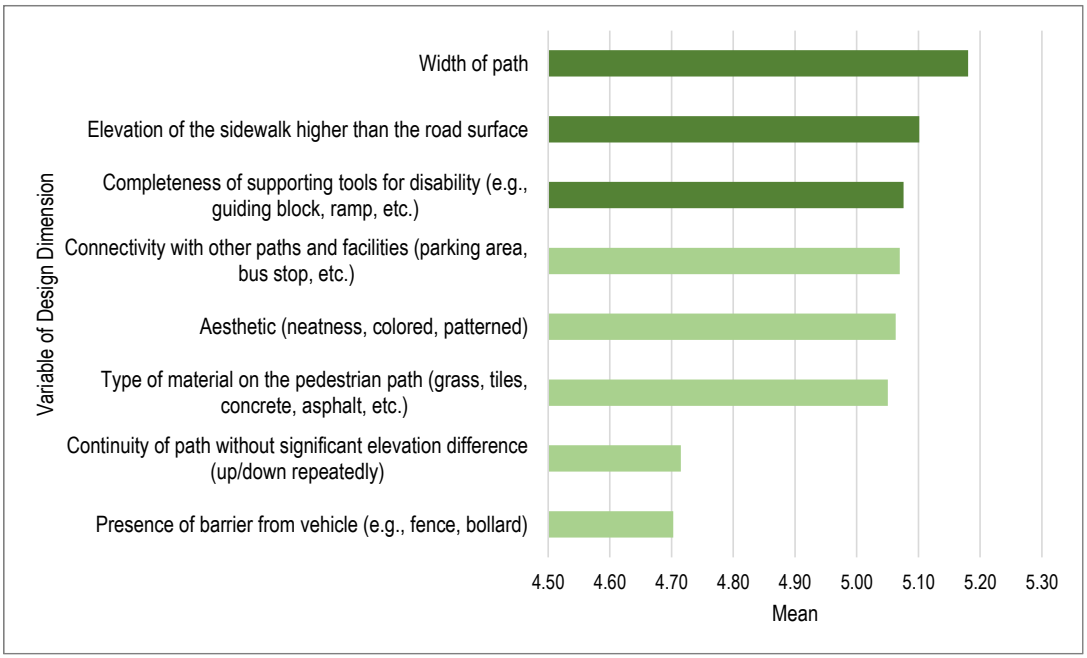


Figure 6.4 Dominant factors of the design dimension

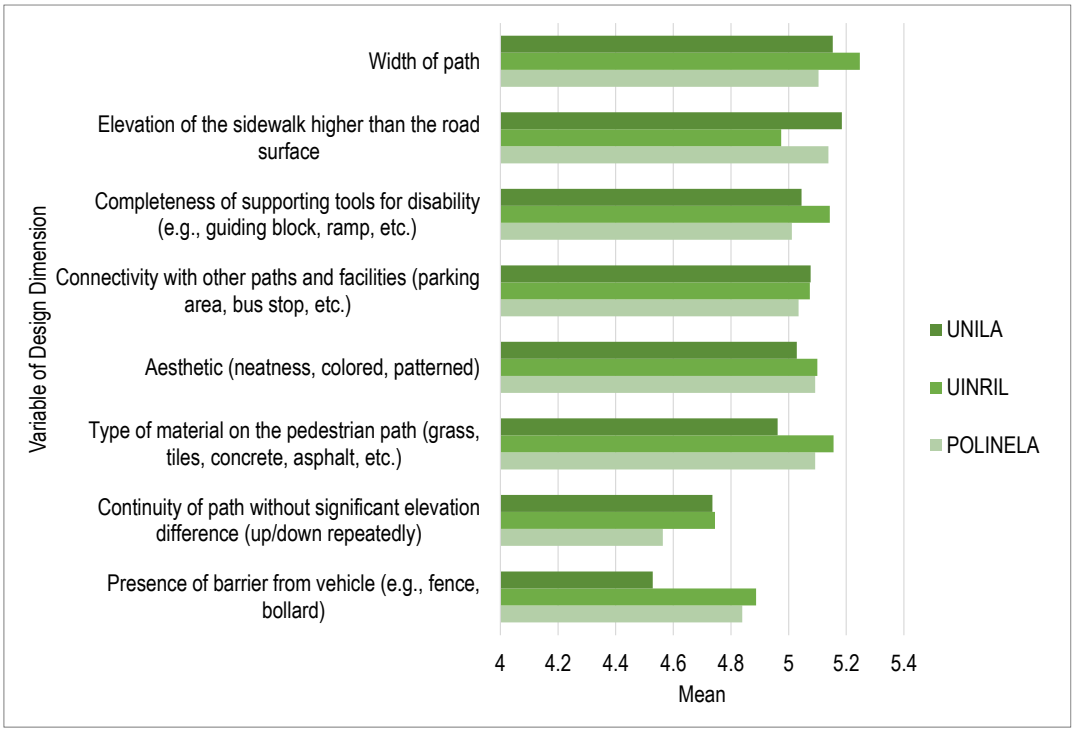


Figure 6.5 Differences in dominant factors of design dimension on the three campuses

Meanwhile, the elevation of the sidewalk higher than road surface variable becomes the second leading variable, meaning that elevation on sidewalks is important. UNILA students are the students who felt that this variable was important while UINRIL students were the opposite. The importance of UNILA students is influenced by the intensity of motor vehicle activity in the campus environment.

In addition, this campus still has a few lanes that tend to have the same elevation as the road does. Thus, students' comfort and safety will increase if the elevation of the path is higher than that of the road. As the completeness variable of supporting tools for disability becomes the third main variable means that students have started to have an awareness of this variable's importance.

Figure 6.6 shows that the variable safe from traffic accident and the variable safe from slipping have the highest average factors of importance in the safety dimension. The safe from traffic accident variable is the most dominant variable because it concerns the level of pedestrian safety. The pedestrian safety level is the most important thing in the implementation of the path. While the variable safe from slipping is a variable related to the physical condition of the path that causes a pedestrian to fall.

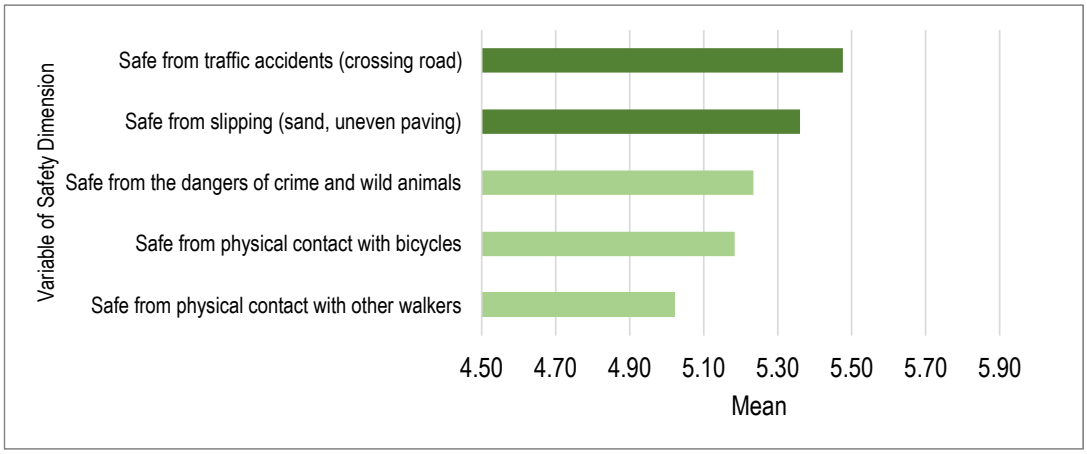


Figure 6.6 Dominant factors of safety dimension

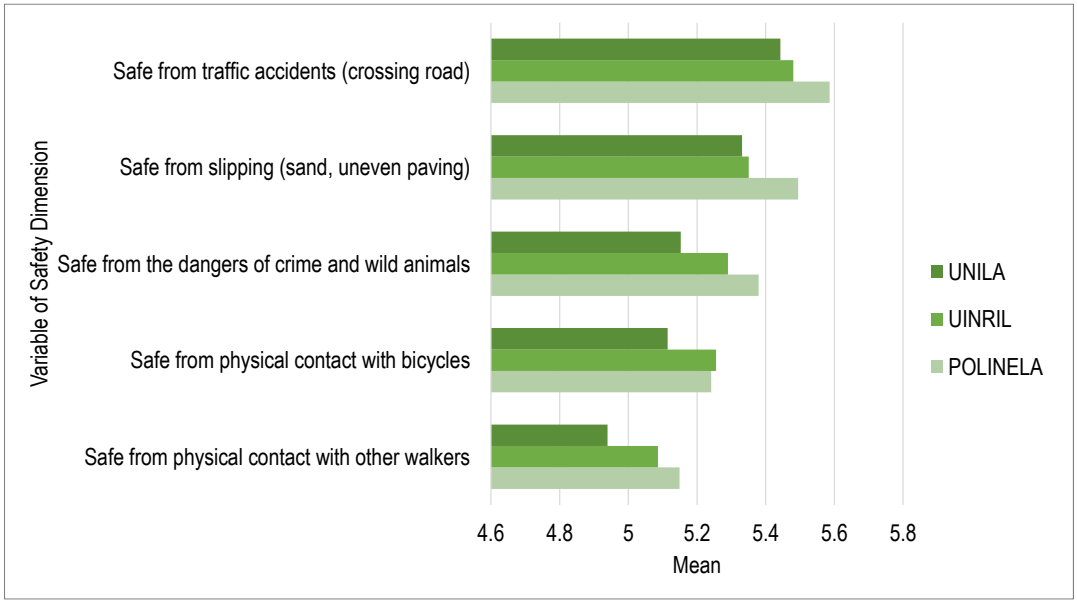


Figure 6.7 Differences in dominant factors of safety dimension on the three campuses

The order of dominance of these safety variables occurs on all three campuses. POLINELA students place the highest level of importance on all variables. While UNILA students are students whose perception exhibits the lowest level of interest. POLINELA students place the highest importance on the two following variables because of the batch dominant factor (2017): duration of student activity (> 9 hours), return frequency after 7 p.m. (very often). One of these conditions directly affects their perception of security. Figure 6.7 shows that the variables of absence of unpleasant smell, pavement cleanliness, and adequacy of light at night are the highest average factors of interest in the sensory dimension. The absence of unpleasant smell variable is the principal variable because the level of discomfort caused by the odor is the very high compared to other variables. The three variables, however, have little difference in the mean value of interest. That is, students also really hope that the campus sidewalk is clean and has adequate lighting at night.

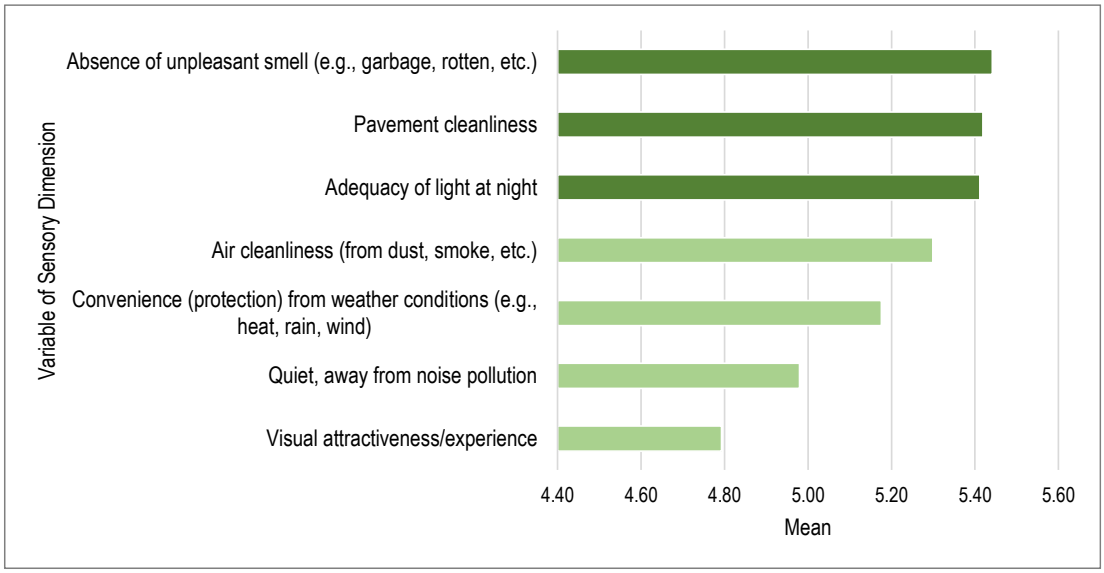


Figure 6.8 Dominant factors of sensory dimension

For these three dominant variables, the perception of being of highest importance is the students of POLINELA, UINRIL, and UNILA. That is, the perception of POLINELA students' expectations to obtain pedestrian track conditions that are not smelly, clean, and the adequacy of night-time light is higher than those of the students from other campuses. This is because the dominant variables in the sensory dimension tend to be influenced by the duration of student activity or the student's running frequency. This means that a higher duration of activity and frequency of student walking will affect the levels of importance in the sensory dimension.

Figure 6.10 shows that the dominant variables in the dimension of amenities include the availability of trash bins, street lighting and sidewalks, and of zebra crossings. The dominance of the availability of trash bins variable is related to the dominance of the sensory dimensions of the absence of unpleasant smell variable (see Figure 6.8). That is, the dominance of the availability of trash bin

variables confirms the absence of the unpleasant smell variable. In addition, the availability of street lighting and sidewalk variables also confirmed the adequacy of the light at night variable. Meanwhile, the variable availability of zebra crossing confirmed the principal variable for the safety of traffic accident dimension.

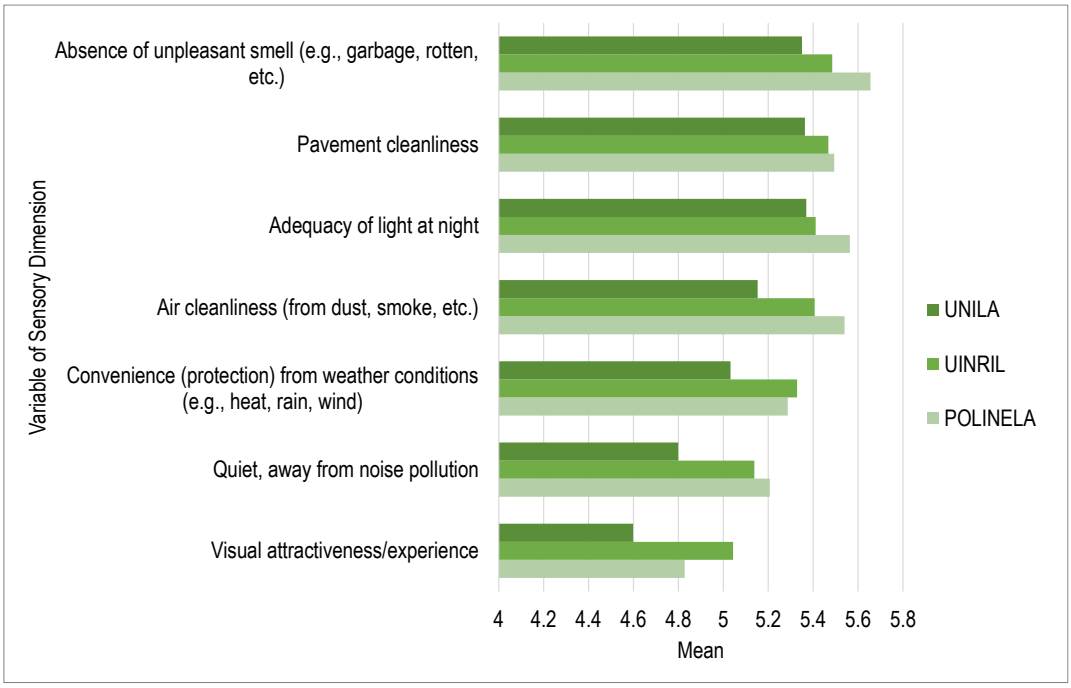


Figure 6.9 Differences in dominant factors of sensory dimension on the three campuses

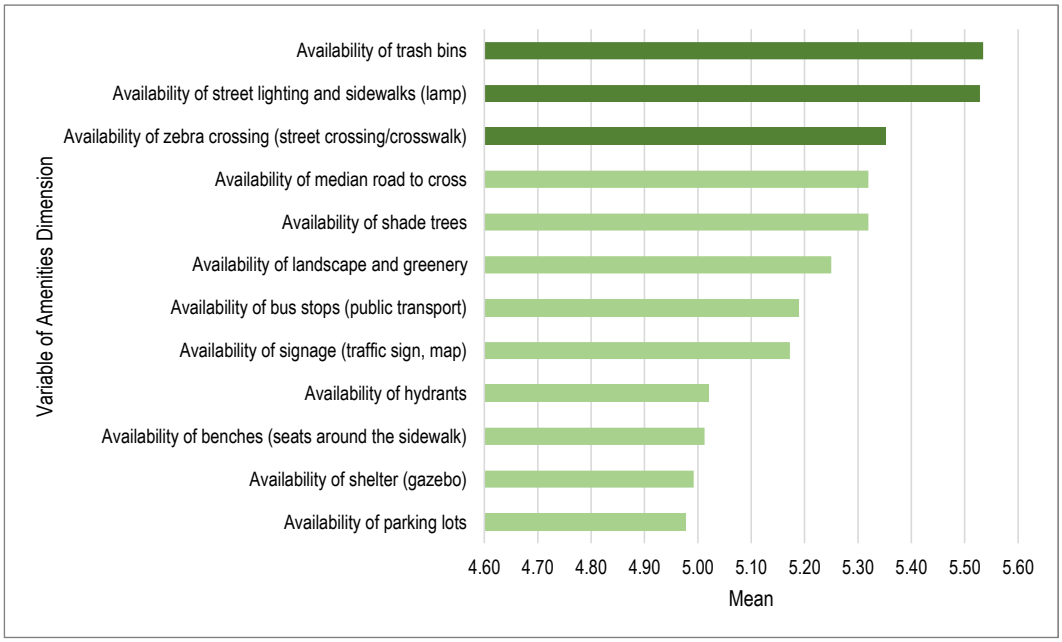


Figure 6.10 Dominant factors of amenities dimension

POLINELA students are students with the highest perceived level of importance for the two most dominant variables, namely, availability of trash bin and availability of street lighting and sidewalks. The variable availability of trash bin was influenced by the dominant factors in the sensory dimension in the form of absence of unpleasant smell and pavement cleanliness variables. Meanwhile, the variable availability of street lighting and sidewalk is influenced by the adequacy of light at night.

The dominant variable in the amenities dimension (availability of zebra crossing) is influenced by the safe from accident variable. This is due to the more complex UNILA campus and higher vehicle density. Thus, availability of this variable is perceived by UNILA students to be important.

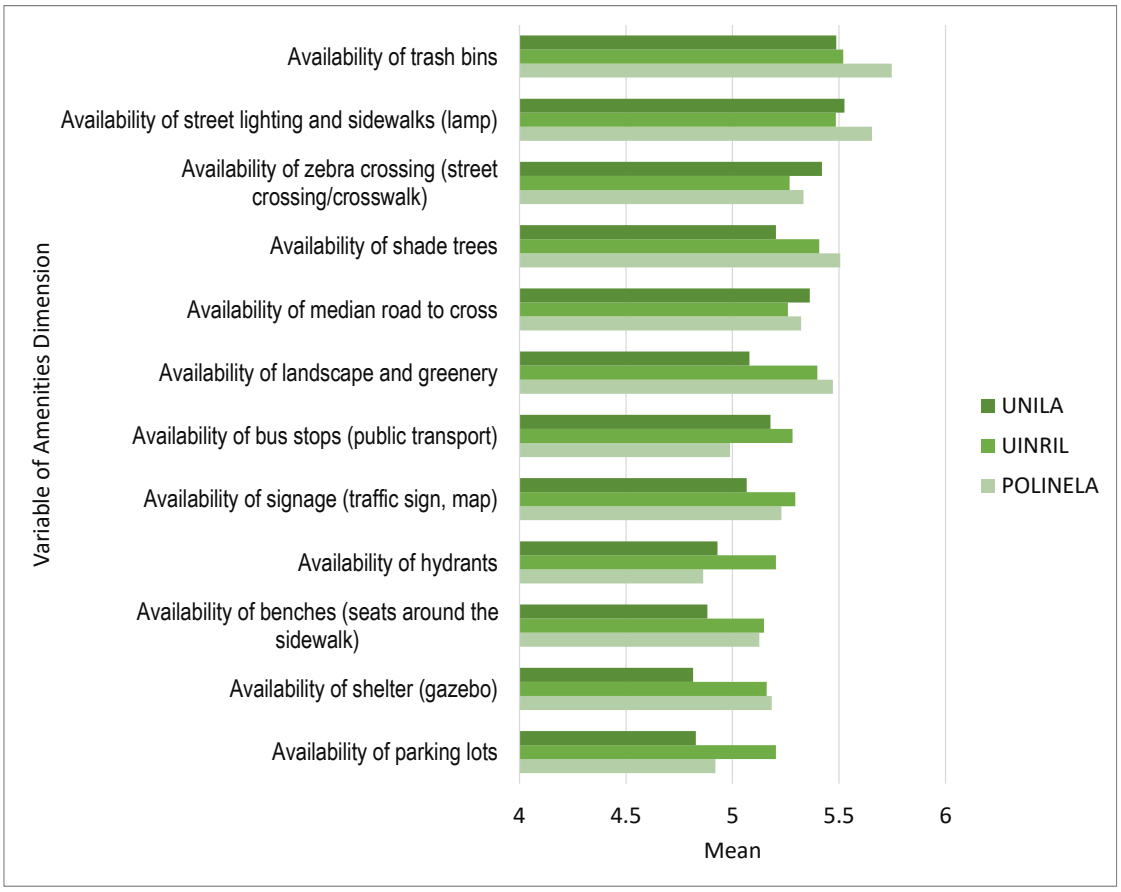


Figure 6.11 Differences in dominant factors of design dimension on the three campuses

Based on the above description, there are fourteen dominant variables consisting of one variable belonging to the quality dimension, three variables to the design dimension, two variables to the safety dimension, three variables to the sensory dimension and five variables to the amenities dimension (Table 6.1). In general, the interest of POLINELA students in the eleven dominant factors tends to be higher than that of other students (nine variables whereas the other two variables are dominated by UINRIL students). This means that the importance of UNILA students tends to be low compared to other campuses. The low level of interest of UNILA students is due to the condition of pedestrian paths at UNILA being better than at other campuses. This condition is clearly indicated by the

sidewalks at UNILA already being constructed of more than 80% adequate pavement, being clean, and not being slippery. Although in some small spots surface damage to the sidewalks, garbage, and other impurities are still found.

Table 6.1 Fourteen Dominant Variable of Importance Level

No	Variable	Dimension
1.	Periodic Maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Quality
2.	Width of path	Design
3.	Elevation of the sidewalk higher than the road surface	Design
4.	Completeness of supporting tools for disability	Design
5.	Safe from traffic accidents (crossing road)	Safety
6.	Safe from slipping (sand, uneven paving)	Safety
7.	Absence of unpleasant smell (e.g., garbage, rotten, etc.)	Sensory
8.	Pavement cleanliness	Sensory
9.	Adequacy of light at night	Sensory
10.	Availability of trash bins	Amenities
11.	Availability of street lighting and sidewalks (lamp)	Amenities
12.	Availability of zebra crossing (street crossing/crosswalk)	Amenities
13.	Availability of median road to cross	Amenities
14.	Availability of shade trees	Amenities

6.3 Differences in Importance Level Based on Dominant Variable Based on Student Profile

This subsection describes the difference in importance of the student profile with respect to the eleven domain variables. Each dominant variable is analyzed by ANOVA to ascertain whether there is difference in interest level for a variable based on a student's profile.

6.3.1 Differences in Importance Level Based on Gender

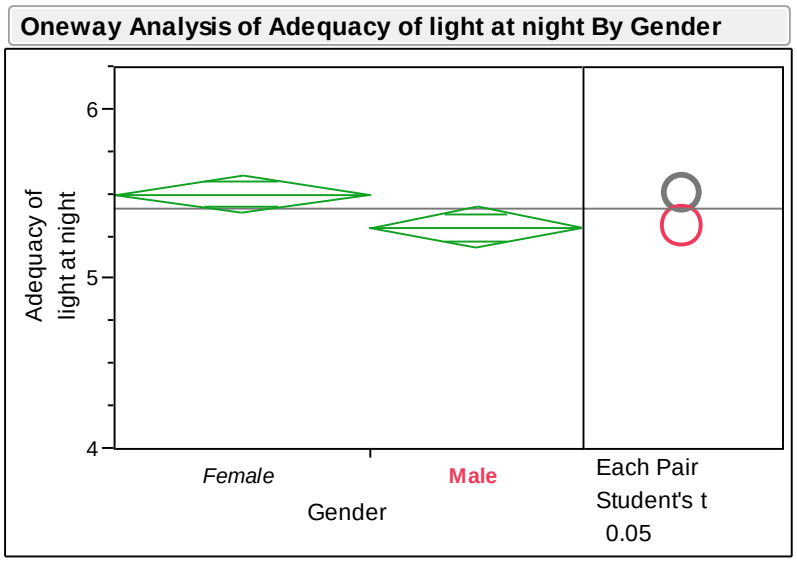
Table 6.2 is a recapitulation of ANOVA results of differences in the importance of students to dominant factors based on the university. ANOVA results show that from eleven dominant variables the only one that had a significant difference is the variable adequacy of light at night (sig. 0.016 *). This means that ten other variables tend to be perceived equally by male and female students.

Figure 6.11 shows the difference in importance of the adequacy of light at night variable. The highest level of importance is perceived by female students. Female students perceive this as being of highest importance because they have a higher concern regarding this aspect. In addition, female students had the longest level of activity compared to males (see Figure 5.30). So, if they go home at 7 p.m., they can still feel comfortable and safe even though, frequent late returns by them tend to be very rare (see Figure 5.31). The high level of interest of female students is influenced by the

POLINELA students. First, female students at POLINELA are the students with the greatest frequency (see Figure 5.2). Secondly, POLINELA students have a return frequency after 7 p.m. greater than that of other students, i.e., 1–3 times a month (see Figure 5.31 (d)).

Table 6.2 One-way Analysis by Gender

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Gender	0.904	0.3421
Elevation of the sidewalk higher than the road surface		3.5641	0.0595
Elevation of the sidewalk higher than the road surface		0.7776	0.3782
Safe from traffic accidents (crossing road)		2.7808	0.0959
Safe from slipping (sand, uneven paving)		2.5815	0.1086
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		2.198	0.1387
Pavement cleanliness		3.7809	0.0523
Adequacy of light at night		5.8383	0.016*
Availability of trash		3.5069	0.0616
Availability of street lighting and sidewalks (lamp)		2.1934	0.1391
Availability of zebra crossing (street crossing/crosswalk)		1.2612	0.2618



Oneway Anova

Means for Oneway Anova

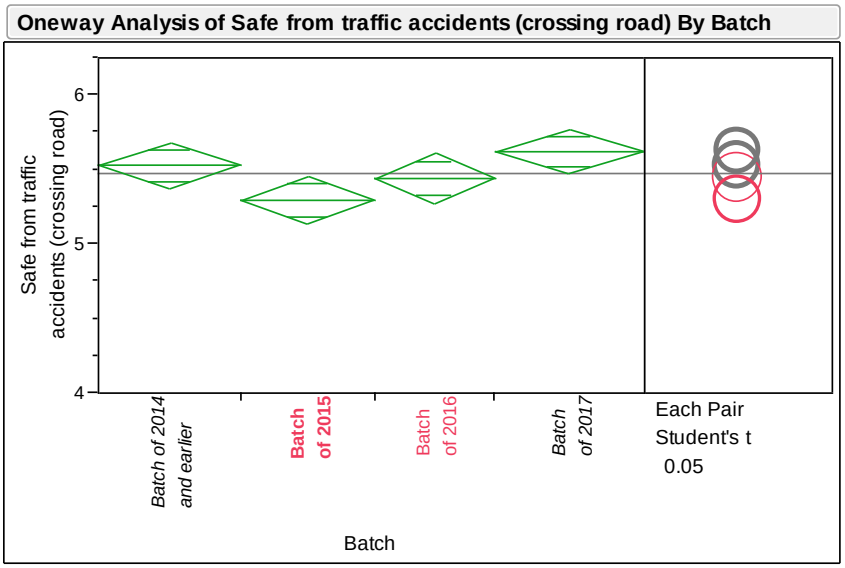
Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Female	345	5.50145	0.05531	5.3928	5.6101
Male	287	5.30314	0.06064	5.1841	5.4222

Figure 6.12 ANOVA between gender and variable adequacy of light at night

6.3.2 Differences in Importance Level Based on Batch

Table 6.3 One-way Analysis by Batch

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Batch	1.2989	0.2738
Elevation of the sidewalk higher than the road surface		0.2674	0.8489
Elevation of the sidewalk higher than the road surface		0.7474	0.5241
Safe from traffic accidents (crossing road)		3.1159	0.0257*
Safe from slipping (sand, uneven paving)		2.0728	0.1026
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		1.4057	0.24
Pavement cleanliness		1.5398	0.203
Adequacy of light at night		1.7305	0.1595
Availability of trash		1.5329	0.2048
Availability of street lighting and sidewalks (lamp)		1.5913	0.1903
Availability of zebra crossing (street crossing/crosswalk)		0.819	0.4836



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Batch of 2014 and earlier	165	5.52727	0.07688	5.3763	5.6783
Batch of 2015	155	5.29677	0.07933	5.1410	5.4526
Batch of 2016	139	5.43885	0.08377	5.2744	5.6033
Batch of 2017	173	5.61850	0.07509	5.4710	5.7659

Figure 6.13 ANOVA between batch and safe from traffic accident

Table 6.3 is a recapitulation of ANOVA results of differences in student importance of dominant factors based on batch. ANOVA results show that from eleven dominant variables only one has a significant difference, that is, safe from traffic accidents (crossing road) (sig. 0.0257 *). This means that the ten other variables tend to be perceived equally by students on all campuses.

Figure 6.13 shows the different importance levels of the safe of traffic accidents (crossing road) variable. Batches 2015 and 2016 are those which have a low perceived level of interest compared to the other batches. This perception is influenced by the short duration of student walking in this class. Thus, their sensitivity to these variables tends to be less.

6.3.3 Differences in Importance Level Based on Student Participation

Table 6.4 is a recapitulation of ANOVA results of differences in level of importance assigned by students to the dominant factor based on student participant. ANOVA results show that none of the dominant variables have significant differences based on student participation. This means that all variables tend to be perceived equally by students at all levels of organizational participation. That is, the level of participation in student organizations influences their level of importance assigned to this variable less.

Table 6.4 One-way Analysis by Participation in student organizations

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Participation in student organizations	0.6823	0.5631
Width of Path		1.6922	0.1674
Elevation of the sidewalk higher than the road surface		1.3855	0.2461
Safe from traffic accidents (crossing road)		1.5159	0.2092
Safe from slipping (sand, uneven paving)		1.8237	0.1416
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		1.0841	0.3552
Pavement cleanliness		1.9647	0.118
Adequacy of light at night		1.526	0.2066
Availability of trash		0.5412	0.6543
Availability of street lighting and sidewalks (lamp)		0.5769	0.6304
Availability of zebra crossing (street crossing/crosswalk)		1.2162	0.3029

6.3.4 Differences in Importance Level Based on Transportation mode

Table 6.5 is a recapitulation of the ANOVA results of the differences in the level of importance assigned by students to the dominant factors based on mode of transportation. ANOVA results show that none of the dominant variables exhibit significant differences based on student participant. This means that all variables tend to be perceived equally by students using all modes of transportation. This means that the different modes of transportation do not affect the difference in importance of the dominant factors.

Table 6.5 One-way Analysis by Transportation modes to campus

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Transportation modes to campus	1.1354	0.3387
Width of Path		2.1515	0.0731
Elevation of the sidewalk higher than the road surface		0.3317	0.8567
Safe from traffic accidents (crossing road)		2.2498	0.0624
Safe from slipping (sand, uneven paving)		1.378	0.24
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		0.8421	0.4988
Pavement cleanliness		1.8969	0.1093
Adequacy of light at night		1.0146	0.3991
Availability of trash		1.3658	0.2443
Availability of street lighting and sidewalks (lamp)		0.9093	0.458
Availability of zebra crossing (street crossing/crosswalk)		1.0517	0.3797

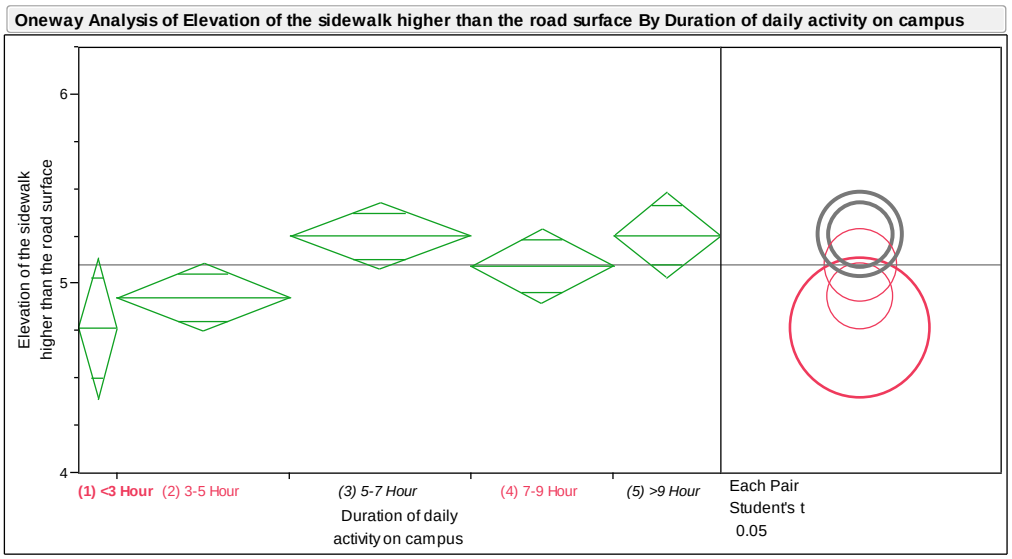
6.4 Differences in Importance Levels Based on Student Activity

6.4.1 Differences in Importance Levels Based on Duration of Activity

Table 6.6 is a recapitulation of ANOVA results of differences in students' perceived level of importance assigned to dominant factors based on duration of activity. ANOVA results show that three of the eleven dominant variables have a significant difference, i.e., safe from traffic accidents (0.0403 *), safe from slipping (0.0433 *). This means that the other eight variables tend to be perceived by other types of duration of activity.

Table 6.6 One-way Analysis by Duration of daily activity on campus

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Duration of daily activity on campus	1.1387	0.3372
Width of Path		1.3463	0.2513
Elevation of the sidewalk higher than the road surface		2.8938	0.0216*
Safe from traffic accidents (crossing road)		2.5178	0.0403*
Safe from slipping (sand, uneven paving)		2.4743	0.0433*
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		1.5214	0.1943
Pavement cleanliness		2.1071	0.0784
Adequacy of light at night		2.1299	0.0756
Availability of trash		1.8052	0.1261
Availability of street lighting and sidewalks (lamp)		2.2952	0.058
Availability of zebra crossing (street crossing/crosswalk)		1.4573	0.2137



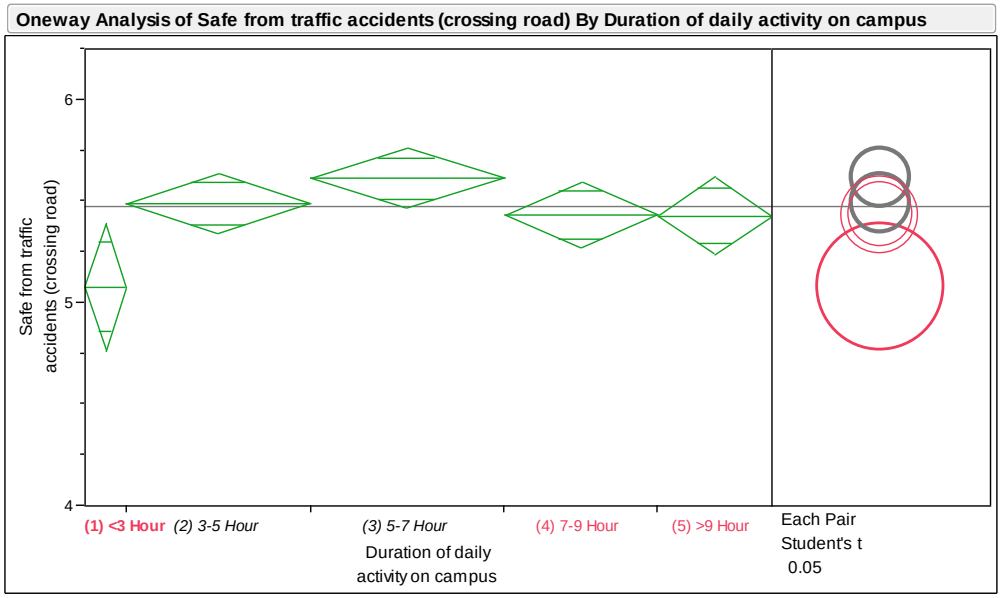
Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) <3 Hour	38	4.76316	0.19081	4.3884	5.1379
(2) 3-5 Hour	170	4.92941	0.09021	4.7523	5.1066
(3) 5-7 Hour	178	5.25281	0.08816	5.0797	5.4259
(4) 7-9 Hour	141	5.09220	0.09906	4.8977	5.2867
(5) >9 Hour	105	5.25714	0.11479	5.0317	5.4826

Figure 6.14 ANOVA between duration of daily activity and elevation of sidewalk higher than the road surface

Figure 6.14 shows the difference in the importance of duration of daily activity on campus on the elevation of the sidewalk higher than the road surface. Activity duration group numbers five (>9 hours per day) and three (5–7 hours per day) are types of activity that make the perception of importance for this factor high. The activity duration of group number five has a close relationship with the POLINELA campus (see Figure 5.16). That is, the existence of elevation which tends to be equal to the road on the POLINELA campus causes students to consider this variable important. Of the activity on the three campuses, the closest relationship is with the UNILA campus. The UNILA campus, however, has a closer relationship with the activity of group number four (7–9 hours per day). That is, UNILA students exert an influence on the duration of activity of all three groups but the effect given is not dominant.



Oneway Anova

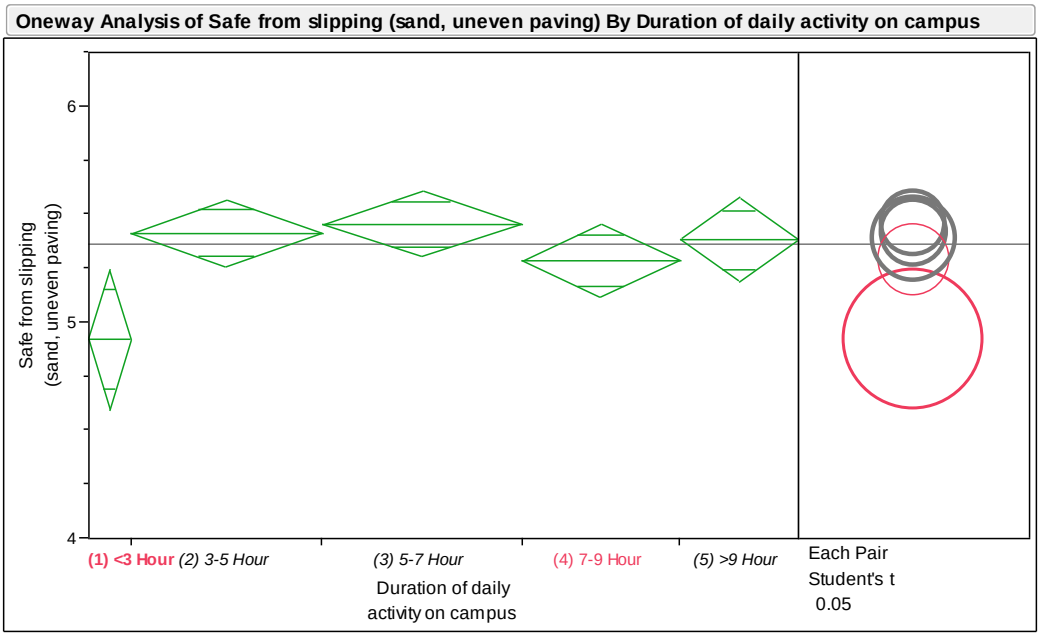
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) <3 Hour	38	5.07895	0.16025	4.7643	5.3936
(2) 3-5 Hour	170	5.48824	0.07576	5.3395	5.6370
(3) 5-7 Hour	178	5.61236	0.07404	5.4670	5.7578
(4) 7-9 Hour	141	5.43262	0.08319	5.2693	5.5960
(5) >9 Hour	105	5.42857	0.09640	5.2393	5.6179

Figure 6.15 ANOVA between duration of daily activity and safe from traffic accident

Figure 6.15 shows the difference in the importance of duration of daily activity on campus on the safe from traffic accidents (crossing road) variable. Activity group two (3–5) and activity three (5-7) is a type of activity that makes perception level of importance to this factor becomes high. The duration of the three activities has a close relationship with the UNILA campus (see Figure 5.16). That is, UNILA campus tends to have influence though not dominant. But the university campus with the highest complexity among other campuses led to high student perceptions of three activities on the variable safe from traffic accident. Meanwhile, activity one has a very close relationship with the UINRIL campus

Figure 6.15 shows the difference in the importance of duration of daily activity on campus on the safe from slipping (sand, uneven paving) variable. Groups three, two, and five are activities with high perceived interest levels. Of the three campuses, the UNILA campus is the most highly-rated one for this variable. This is due to the existence of a sandy path that has the potential to cause a slip.



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) <3 Hour	38	4.92105	0.16511	4.5968	5.2453
(2) 3-5 Hour	170	5.41176	0.07806	5.2585	5.5651
(3) 5-7 Hour	178	5.45506	0.07629	5.3052	5.6049
(4) 7-9 Hour	141	5.28369	0.08571	5.1154	5.4520
(5) >9 Hour	105	5.38095	0.09933	5.1859	5.5760

Figure 6.16 ANOVA between duration of daily activity and safe from slipping

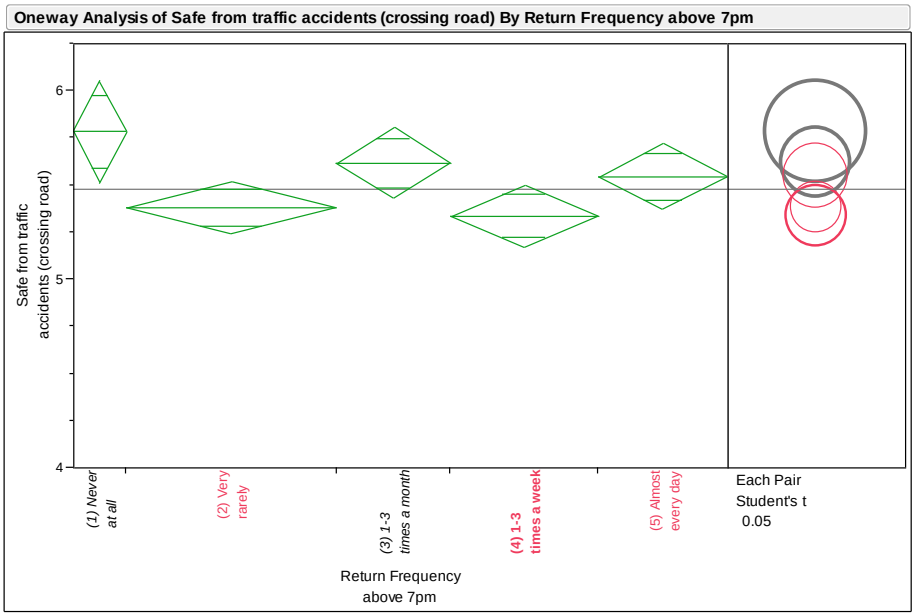
In general, significant differences occur in the shortest activity (<3 hours). In the three dominant variables, an activity of less than 3 hours is an activity that causes the perception of interest level to be low. That is, the duration of student activity on campus is less likely to affect students' perception of the importance of a low variable.

6.4.2 Differences in Importance Levels Based on Return Frequency after 7 p.m.

Table 6.7 One-way Analysis by Return Frequency over 7 pm is a recapitulation of ANOVA results of differences in student importance of the dominant factor of frequency return after 7 p.m. ANOVA results show that from eleven dominant variables only one variable, safe from traffic accidents (0.0133 *), has a significant difference. This means that the other ten variables tend to be perceived equally by the type of sub-variable for return frequency.

Table 6.7 One-way Analysis by Return Frequency over 7 pm

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Return Frequency over 7 pm	0.7739	0.5424
Width of Path		1.6863	0.1515
Elevation of the sidewalk higher than the road surface		1.0122	0.4003
Safe from traffic accidents (crossing road)		3.1808	0.0133*
Safe from slipping (sand, uneven paving)		0.531	0.713
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		1.2195	0.3013
Pavement cleanliness		1.4599	0.2128
Adequacy of light at night		0.6889	0.5998
Availability of trash		0.834	0.5038
Availability of street lighting and sidewalks (lamp)		0.3862	0.8186
Availability of zebra crossing (street crossing/crosswalk)		0.5869	0.6722



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) Never at all	51	5.78431	0.13804	5.5132	6.0554
(2) Very rarely	203	5.37931	0.06919	5.2434	5.5152
(3) 1-3 times a month	110	5.61818	0.09399	5.4336	5.8028
(4) 1-3 times a week	143	5.33566	0.08243	5.1738	5.4975
(5) Almost every day	125	5.54400	0.08817	5.3709	5.7171

Figure 6.17 ANOVA between return frequency after 7 p.m. and safe from traffic accident

Figure 6.16 shows the difference in importance for the safe from traffic accidents variable. Students who never go home late and have a return frequency (RF) of 1–3 times a month are students who have high perceptions of this variable. Students who never influence RF tend to be UINRIL students, though they are not dominant. RF 1–3 times per month is slightly influenced by UNILA students (see Figure 5.13).

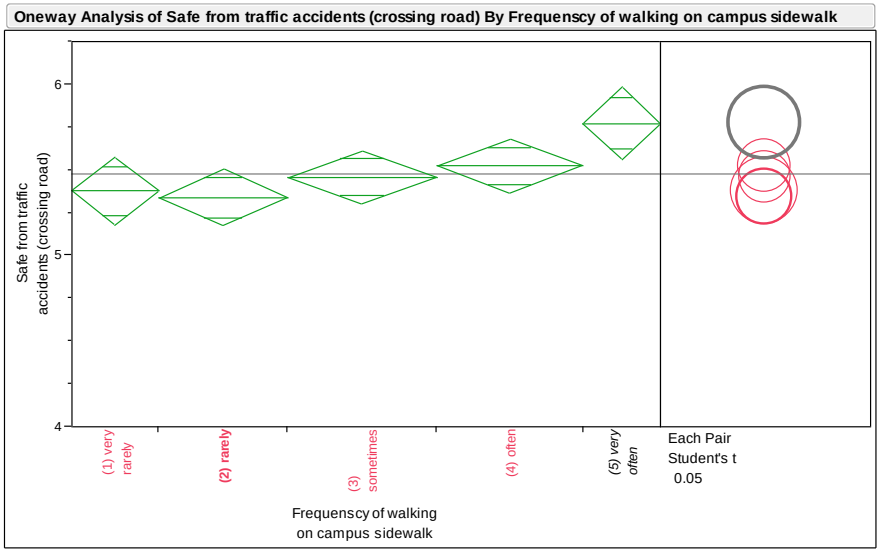
6.4.3 Differences in Importance Levels Based on Walking Frequency

Table 6.8 One-way Analysis by Walking frequency a recapitulation of ANOVA results of differences in student importance in dominant factors based on walking frequency. ANOVA results show that five of the 11 dominant variables have significant differences: Safe from traffic accidents (sig. 0.0223 *), Safe from slipping (0.0129 *), Absence of unpleasant smell (0.0454 *), Pavement cleanliness (0.0321 *), Adequacy of light at night (0.017 *). This means that the other seven variables tend to be perceived equally by sub variable walking frequency.

Table 6.8 One-way Analysis by Walking frequency

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Frequency of walking on campus sidewalk	1.8426	0.119
Width of Path		2.2	0.0676
Elevation of the sidewalk higher than the road surface		1.3119	0.2641
Safe from traffic accidents (crossing road)		2.8738	0.0223*
Safe from slipping (sand, uneven paving)		3.1978	0.0129*
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		2.4459	0.0454*
Pavement cleanliness		2.6552	0.0321*
Adequacy of light at night		3.0349	0.017*
Availability of trash		2.0953	0.0799
Availability of street lighting and sidewalks (lamp)		2.015	0.0908
Availability of zebra crossing (street crossing/crosswalk)		1.4678	0.2104

Figure 6.18 shows the differences among a sub-variable for walking frequency. The highest rate of perceived interest is on the variable safe from traffic accident among students who have running frequencies of very often. That is, the more often a person walks, the higher the perception of their level of interest in this variable. Students with the most frequent frequencies are POLINELA students (see Figure 5.22). That is, running frequency is linear with the interest in safe from traffic accident.

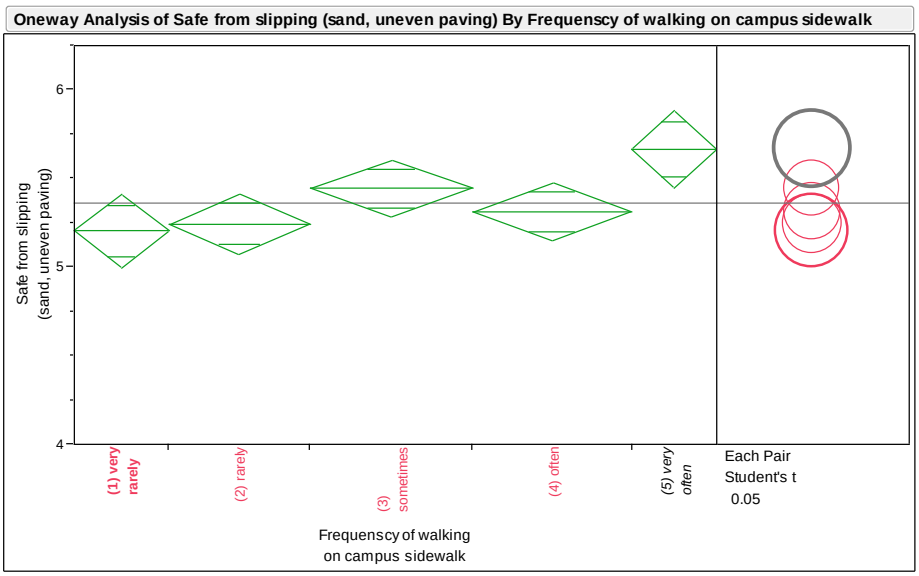


Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) very rarely	93	5.37634	0.10232	5.1754	5.5773
(2) rarely	139	5.33813	0.08369	5.1738	5.5025
(3) sometimes	160	5.45625	0.07801	5.3031	5.6094
(4) often	157	5.52229	0.07875	5.3677	5.6769
(5) very often	83	5.77108	0.10831	5.5584	5.9838

Figure 6.18 ANOVA between frequency of walking on campus sidewalk and safe from traffic accident



Oneway Anova

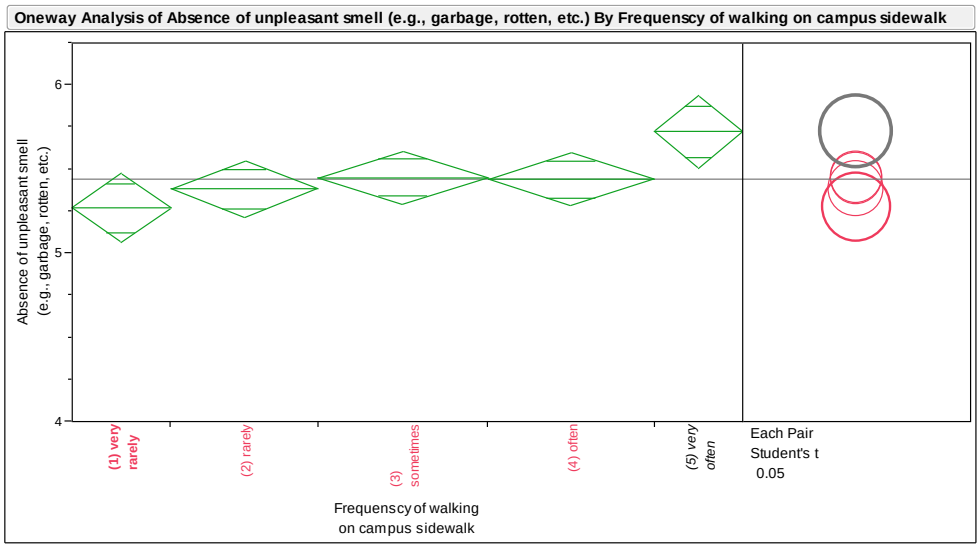
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) very rarely	93	5.20430	0.10530	4.9975	5.4111
(2) rarely	139	5.24460	0.08613	5.0755	5.4137
(3) sometimes	160	5.44375	0.08028	5.2861	5.6014
(4) often	157	5.31210	0.08104	5.1530	5.4713
(5) very often	83	5.66265	0.11146	5.4438	5.8815

Figure 6.19 ANOVA between frequency of walking on campus sidewalk and safe from slipping

Figure 6.19 shows the differences among a sub-variable for walking frequency. The highest rate of perceived interest for the variable safe from slipping is from the students who have running frequencies of very often. This frequency is closest to that of the POLINELA campus students (see Figure 5.2). The activity group numbered three is sometimes the activity with second highest importance level. UNILA and UINRIL campuses are the closest ones to this activity. That is, both campuses have an influence on the importance of this variable.

Figure 6.20 shows the difference among sub-variables for walking frequency. The highest level of perceived interest in the variable absence of unpleasant smell is among the students who have running frequencies of very often. That is, the more often a person walks, the higher the perception of their level of interest in this variable.



Oneway Anova

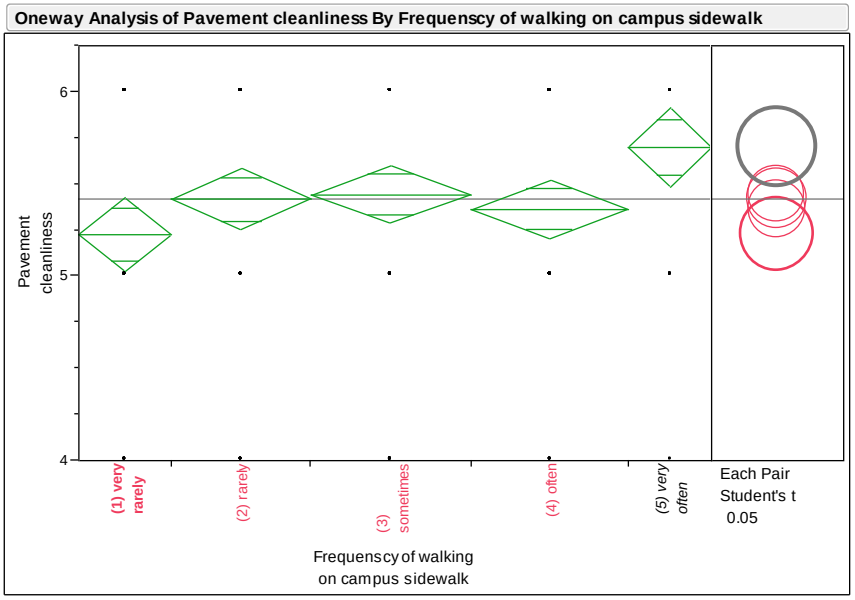
Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) very rarely	93	5.26882	0.10411	5.0644	5.4733
(2) rarely	139	5.38129	0.08515	5.2141	5.5485
(3) sometimes	160	5.45000	0.07937	5.2941	5.6059
(4) often	157	5.43949	0.08012	5.2821	5.5968
(5) very often	83	5.72289	0.11020	5.5065	5.9393

Figure 6.20 ANOVA between frequency of walking on campus sidewalk and absence of unpleasant smell

Figure 6.21 shows the differences among a sub-variable for walking frequency. The perception of the variable pavement cleanliness as being of the highest importance is among the students who have running frequencies of very often. That is, the more often a person walks, the higher the perception of their interest level in this variable.

Figure 6.22 shows the differences among a sub-variable for walking frequency. The perception of the variable adequacy of light at night as being of the highest level of interest is among students who have running frequencies of very often. That is, the more often a person walks, the higher their perception of interest in this variable.

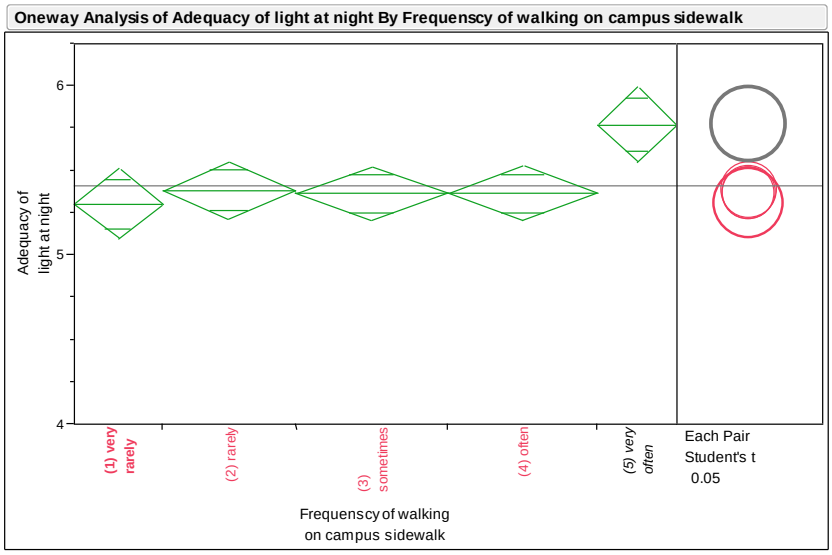


Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) very rarely	93	5.22581	0.10339	5.0228	5.4288
(2) rarely	139	5.41727	0.08457	5.2512	5.5833
(3) sometimes	160	5.44375	0.07882	5.2890	5.5985
(4) often	157	5.36306	0.07957	5.2068	5.5193
(5) very often	83	5.69880	0.10944	5.4839	5.9137

Figure 6.21 ANOVA between frequency of walking and pavement cleanliness



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) very rarely	93	5.30108	0.10625	5.0924	5.5097
(2) rarely	139	5.38129	0.08691	5.2106	5.5520
(3) sometimes	160	5.36250	0.08101	5.2034	5.5216
(4) often	157	5.36306	0.08178	5.2025	5.5236
(5) very often	83	5.77108	0.11247	5.5502	5.9919

Figure 6.22 ANOVA between frequency of walking and adequacy of light at night

Based on the difference in dominant variables above, the level of importance of the dominant variable is influenced by the current level of frequency of the activity. That is, the more often students walk, then the higher their level of perceived interest. The average level of importance in the dominant variable, however, also tends to be moderate.

6.4.4 Differences in Importance Levels Based on Walking Duration

Table 6.9 is a recapitulation of ANOVA results of the differences in student interest level on dominant factors based on the activity running duration. ANOVA results show that from eleven dominant variables there is no one variable which has a significant difference with respect to the duration of student walking. This means that eleven dominant variables tend to be perceived equally by students on all campuses.

Table 6.9 One way Analysis by Duration of walking on campus sidewalk

One way Analysis	By	F Ratio	Prob > F
Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	Duration of walking on campus sidewalk	0.4413	0.7788
Width of Path		1.2274	0.2979
Elevation of the sidewalk higher than the road surface		1.7832	0.1305
Safe from traffic accidents (crossing road)		0.9014	0.4627
Safe from slipping (sand, uneven paving)		1.2905	0.2724
Absence of unpleasant smell (e.g., garbage, rotten, etc.)		0.6048	0.6593
Pavement cleanliness		1.2987	0.2691
Adequacy of light at night		2.3734	0.051
Availability of trash		0.5453	0.7026
Availability of street lighting and sidewalks (lamp)		0.9511	0.4339
Availability of zebra crossing (street crossing/crosswalk)		0.6808	0.6054

6.5 Section Conclusions

The study found that the profiles that differed in importance were gender and batch. Differences in the gender profile were with regard to the adequacy of light at night variable, while the batch profile showed differences with respect to the variable safe from traffic accident. POLINELA students have the highest level of perceived importance for both factors. That is, attention to these variables is serious, especially among the POLINELA students. This is supported by the findings in chapter 5 that gender and batch include profiles that affect activity.

Table 6.10 Dominant Variable on Student Profile

Student Profile	**No.**	**Dominant Variable**	**Dimension**
Gender	1	Adequacy of light at night	Sensory
Batch	2	Safe from traffic accidents (crossing road)	Safety

Other findings concerning student activities are that duration of daily activity on campus, return frequency, and walking frequency have different importance levels. Differences in importance levels for duration of daily activity on campus occurs for the elevation of the sidewalk higher than the road surface, safe from traffic accidents, and safe from slipping variables. The difference in importance level regarding return frequency after 7 p.m. occurs only for the variable safe from traffic accidents (crossing road). Meanwhile, the difference in importance level in frequency of walking occurs for the variables safe from traffic accidents, safe from slipping, absence of unpleasant smell, pavement cleanliness, and adequacy of light at night. Overall, POLINELA students are the students who most influence the difference in importance levels for the dominant variable (67%). The variable safe from accident is the most significant variable that causes differences in levels of importance with respect to student activity (44%).

Table 6.11 Dominant Variable on Student Activity

Student Activity	No.	Dominant Variable	Dimension
Duration of daily activity on campus	1	Elevation of the sidewalk higher than the road surface	Design
	2	Safe from traffic accidents (crossing road)	Safety
	3	Safe from slipping (sand, uneven paving)	Safety
Return Frequency over 7 pm	4	Safe from traffic accidents (crossing road)	Safety
Frequency of walking	5	Safe from traffic accidents (crossing road)	Safety
	6	Safe from slipping (sand, uneven paving)	
	7	Absence of unpleasant smell (e.g., garbage, rotten, etc.)	Sensory
	8	Pavement cleanliness	
	9	Adequacy of light at night	

Chapter 7. Satisfaction Analysis of Student Pedestrians on Public University Sidewalks in Lampung

This chapter describes the factors related to the dominant satisfaction level as assessed by using the five dimensions model on public campuses, correlation analysis between the five dimensions model variable and the level satisfaction in each dimension, and the influence of the five dimensions variable on the overall satisfaction.

7.1 Introduction

The evaluation of levels of satisfaction in this chapter attempts to compare the perceptions of student satisfaction with their perception of importance. The relationship between these two results in four new satisfaction perceptions. These perceptions include:

1. If the interest level is high while the satisfaction level is low, then satisfaction is low.
2. If the level of importance is high while the level of satisfaction is high, then satisfaction is adequate.
3. If the interest level is low while the satisfaction level is low, then satisfaction is lower.
4. If the interest level is low while the level of satisfaction is high, then satisfaction is excessive.

The number of dominant variables is taken from a maximum of 40% of the total variables in each dimension. This criterion is taken to achieve consistency in the proportion of the number of dominant factors among the dimensions that have the least variables (quality: 4 variables) and dimensions that have the most variables (amenities: 12 variables).

7.2 Dominant Factors that are considered to Constitute Satisfaction by Students

This section explains the dominant factors of student's average satisfaction with campus sidewalks using the five dimensions variable evaluation model. Distribution analysis is used to facilitate understanding of dominant factors. The x-axis is the mean of satisfaction whereas the y-axis is the variable of satisfaction.

7.2.1 Dominant Factors of Student Satisfaction on the Dimension of Quality

Figure 7.1 shows that roughness level of the surface’s material is the factor with which students are most satisfied. That is, students can walk safely without the fear of slipping. With respect to other factors, the mean difference is not very significant between one factor and another. The factor with which students perceive themselves to be not satisfied is periodic maintenance. That is, students still expect the lane to receive better care.

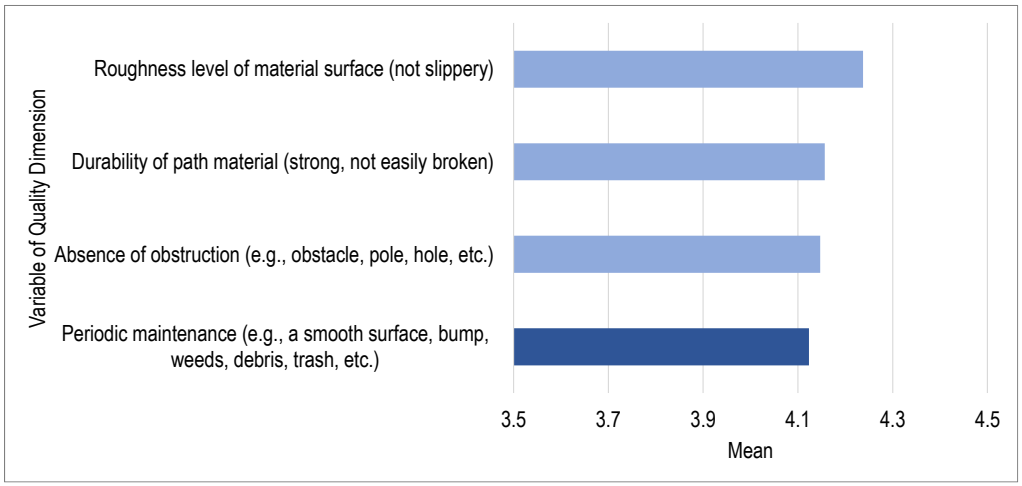


Figure 7.1 Dominant factors of satisfaction level for quality dimension

Figure 7.2 shows the differences in student satisfaction with the quality dimension variable. UINRIL students are those who feel the greatest dissatisfaction with the variable roughness level of material. This is due to the fact that the material on the campus' surface is in the form of grass or a dirt road. Thus, this condition creates a danger of slipping due to slippery sand if it is raining.

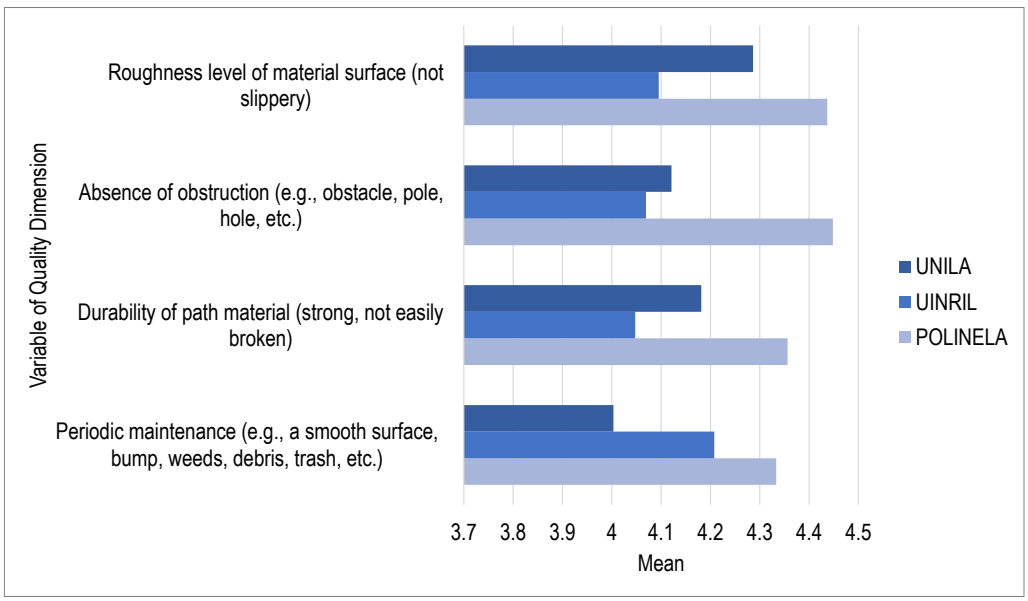
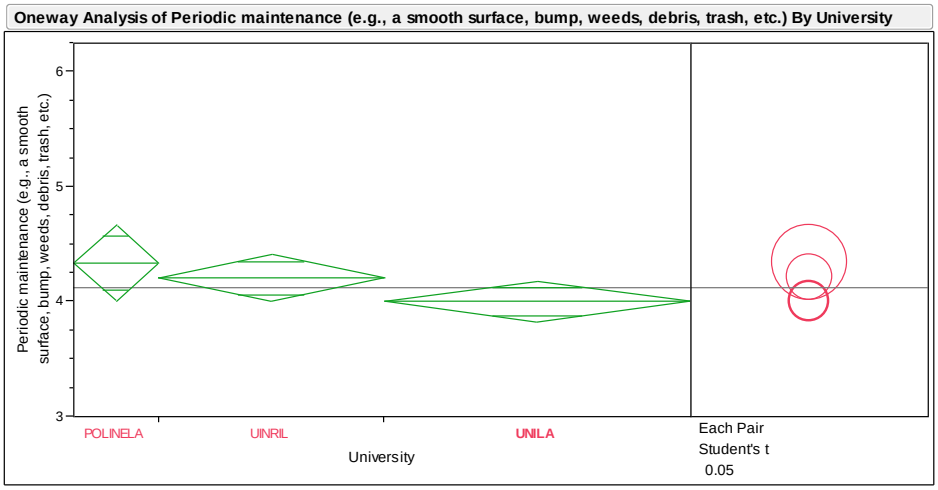


Figure 7.2 Satisfaction level differences in quality dimension on the three campuses

In the absence of obstacle variables, UINRIL and UNILA students tend to feel more dissatisfied than POLINELA students. This is because the UINRIL campus paths have many trees in the middle of the lane which blocks pedestrians (Figure 7.3). Meanwhile, obstructions on the UNILA campus are in the form of poles and drainage holes (Figure 7.4). This dissatisfaction with the present circumstances illustrates that UINRIL and UNILA students want pathway conditions that are free from any obstacles.

Figure 7.3 Obstruction on UINRIL campus

Figure 7.4 Obstruction (hole and pole) on UNILA campus



Oneway Anova

Means for Oneway Anova

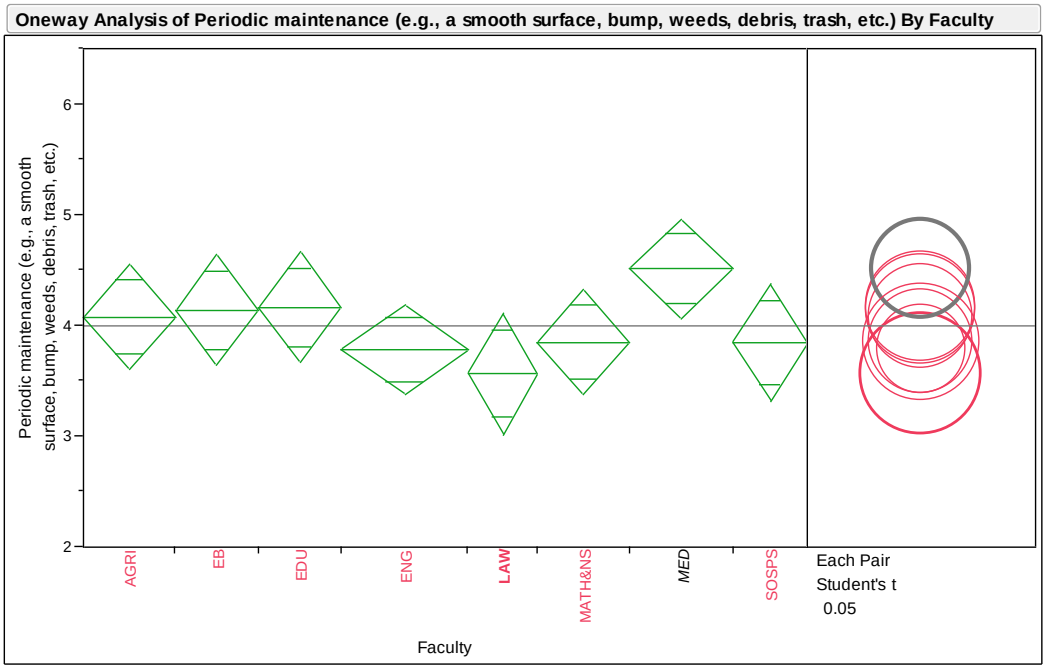
Level	Number	Mean	Std Error	Lower 95%	Upper 95%
POLINELA	87	4.33333	0.16908	4.0013	4.6654
UINRIL	231	4.20779	0.10376	4.0040	4.4116
UNILA	314	4.00318	0.08900	3.8284	4.1780

Figure 7.5 ANOVA between university and periodic maintenance

With regard to the variable durability of path material, the students on the UINRIL campus are dissatisfied. This is due to the campus sidewalks being constructed of grass which is very easily damaged when used for running and is also easily damaged by the weather, i.e., rain and heat from the sun.

With respect to the variable periodic maintenance, UNILA students are those with the lowest level of satisfaction compared to other college students. Figure 7.5 shows the differences in student satisfaction levels among campuses with periodic maintenance variables. The x-axis explains the campus variables, while the y-axis describes the satisfaction level for the periodic maintenance variable. The diamond position (green line) describes the importance of a campus, while the red circle explains the position of different levels of importance.

Although there was no significant difference (sig. >0.05), the level of UNILA student satisfaction was low for this factor. This is due to walking being the dominant mode of transportation among UNILA students. Thus, their attention to this condition is considerable.



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
AGRI	40	4.07500	0.24176	3.5993	4.5507
EB	36	4.13889	0.25484	3.6374	4.6403
EDU	36	4.16667	0.25484	3.6652	4.6681
ENG	55	3.78182	0.20617	3.3761	4.1875
LAW	30	3.56667	0.27916	3.0174	4.1160
MATH&NS	40	3.85000	0.24176	3.3743	4.3257
MED	45	4.51111	0.22793	4.0626	4.9596
SOSPS	32	3.84375	0.27029	3.3119	4.3756

Figure 7.6 ANOVA between faculty (UNILA) and periodic maintenance

Figure 7.6 shows the differences in UNILA student satisfaction levels among faculties regarding the variable periodic maintenance (sig. 0.1878). Based on the significant values available, analysis of variance shows no differences among faculties' satisfaction levels. One faculty (MED), however, shows the highest level of satisfaction. This is because the majority of MED students are motor vehicle users. This has an effect on their mobility in the campus environment. Meanwhile, LAW students are the most dissatisfied ones. This is because LAW faculty students are public transport users. Thus, their access from the bus stop to the faculty building is the route most prone to poor conditions.

Figure 7.7 shows the physical condition of one path from the bus stop to the law faculty. The physical condition of the path indicates a damaged surface that is perforated, grassy, and is obstructed by a tree stump. These conditions cause law students' levels of satisfaction to be low. Routine care of the path is needed to improve their level of satisfaction. The priority needs to be to repair large-scale damage because, this will have an impact on their running security response.

Figure 7.7 Existing conditions of UNILA sidewalks

Figure 7.7 shows the dominant factors of levels of student satisfaction with the dimension of design. The dominant factors include elevation of the sidewalk higher than the road surface, the type of material on the sidewalk, and connectivity with other paths and facilities. The elevation of the sidewalk higher than the road surface variable is the second most dominant factor in student interest

(see Table 6.3). That is, the relationship between the level of importance and satisfaction in these variables tend to be linear. Thus, the conditions in this variable tend to be good. In the variable type of material on the pedestrian path, the importance level is of the sixth order. Thus, the condition occurring in this variable is an exaggerated one because the level of importance is lower than that of the client. The variable connectivity with other paths and facilities is third in terms of satisfaction but fourth in levels of importance. Thus, levels of interest tend to be moderate, while satisfaction levels tend to be dominant. These conditions include those that are slightly excessive.

7.2.2 Dominant Factors of Student Satisfaction with Dimension of Design

Figure 7.8 shows the factors with the lowest satisfaction levels, i.e., completeness of supporting tools for disability, presence of barrier from vehicles, and width of path. Figure 7.9 shows that UNILA students are those with the lowest satisfaction levels with respect to the completeness of supporting tools for disability. In general, this campus has adequate pavement conditions. Thus, students want better availability of supporting tools for disability. This means that students' awareness of universal design is improving.

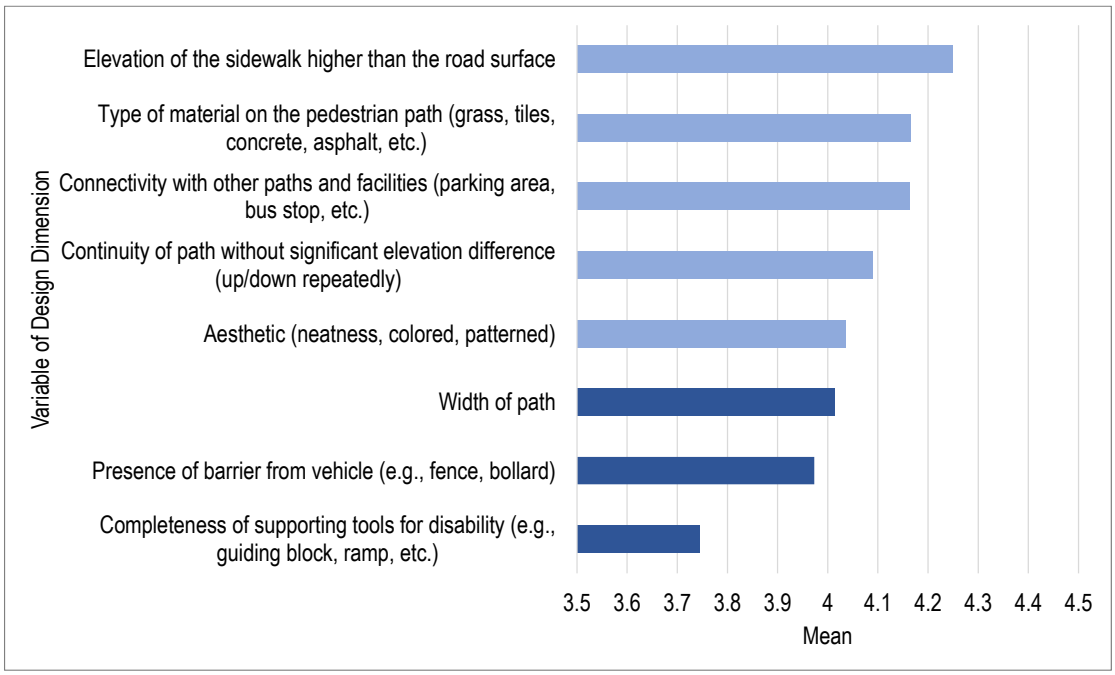


Figure 7.8 Dominant factors of satisfaction level with design dimension

With respect to the variable presence of barrier from vehicles, the three campuses do not show significant differences in satisfaction levels. That is, the existence of the barrier on the track is considered important by students in the interest of pedestrian security.

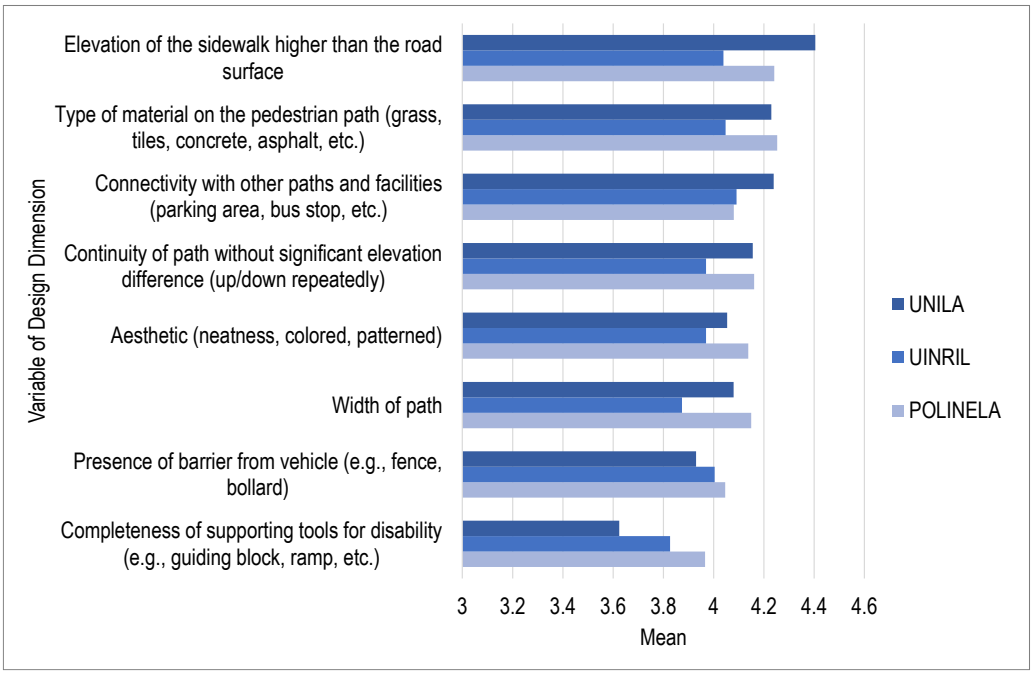
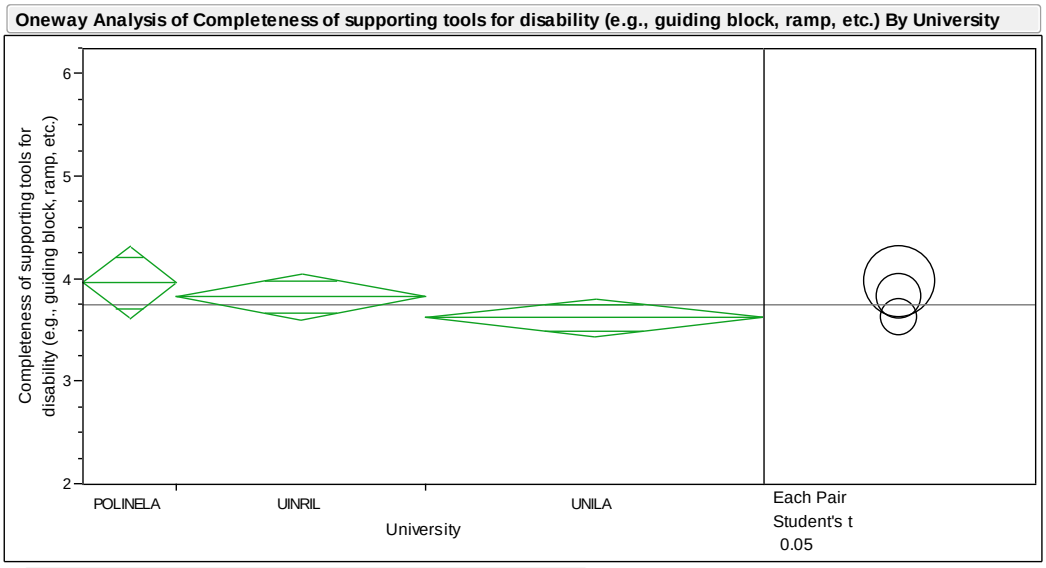


Figure 7.9 Dominant factors of satisfaction level with design dimension on the three campuses



Oneway Anova

Means for Oneway Anova

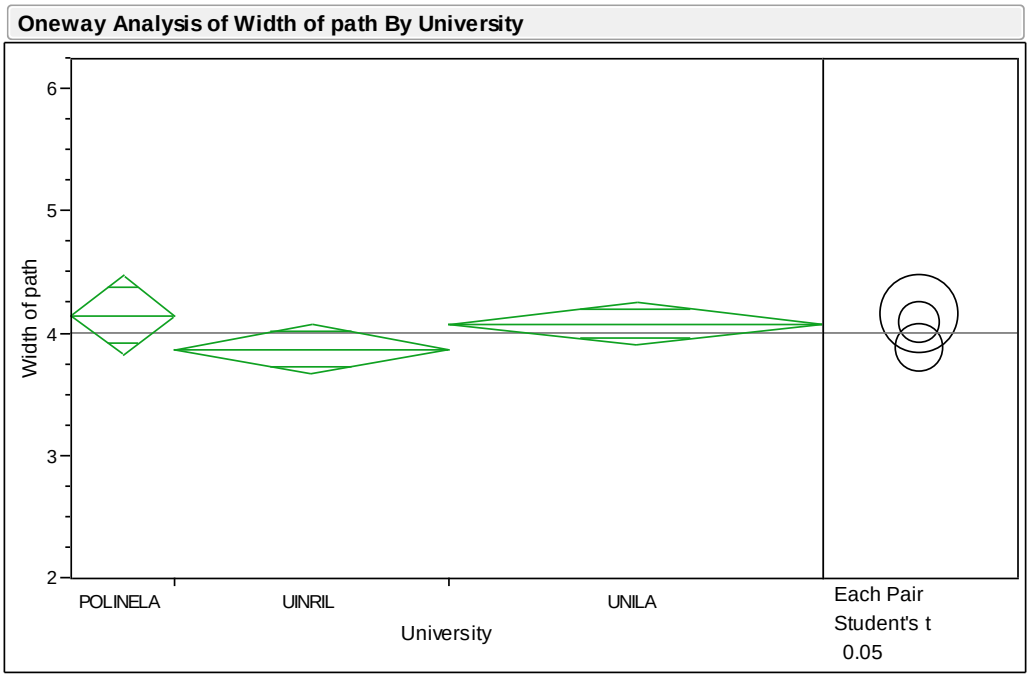
Level	Number	Mean	Std Error	Lower 95%	Upper 95%
POLINELA	87	3.96552	0.18084	3.6104	4.3206
UINRIL	231	3.82684	0.11098	3.6089	4.0448
UNILA	314	3.62420	0.09519	3.4373	3.8111

Figure 7.10 ANOVA between university and completeness of supporting tools for disability

The lowest dominant variable is third in order of its level of importance. Thus, this variable tends to have a fairly large gap. That is, students have great expectations surrounding these variables but

their satisfaction levels are low. Figure 7.8 shows the different levels of satisfaction on all three campuses. A significance value in this analysis is greater than 0.05 so all three campuses tend to have the same perception of this variable. Existing conditions indicate the lack of supporting tools for disability. Thus, mobility for those who are disabled is difficult within the campus environment (Figure 7.11). The absence of supporting tools for those who are disabled is indicated by the absence of ram. The existence of ram is the primary support to accommodate the disabled in the campus environment.

Figure 7.11 Existing condition of supporting tools for disability



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
POLINELA	87	4.14943	0.16464	3.8261	4.4727
UINRIL	231	3.87446	0.10104	3.6760	4.0729
UNILA	314	4.07962	0.08666	3.9094	4.2498

Figure 7.12 ANOVA between university width of path

The variable presence of barrier is the second least dominant variable with a level of interest of eight (lowest). Thus, these variables tend to have small gaps. That is, the level of interest and student

satisfaction for this variable are low. So, the gap that occurs tends to be small and this variable does not become a priority for improvement.

The third least dominant variable has the highest level of importance. Thus, this variable tends to have a fairly large gap. That is, students have great expectations regarding these variables but their satisfaction levels are low. Figure 7.8 shows the different levels of satisfaction on all three campuses. A significance value in this analysis is more than 0.05 so all three campuses tend to have the same perception of this variable. That is, all three campuses need improvement with respect to this variable.

Existing conditions indicate some narrow spots on the paths (Figure 7.13). The narrowest width is between 0.7–0.9m. That is, students with mobility issues, together with their friends, who feel the condition of the path is narrow respond that they are not satisfied. Widening of paths is needed to facilitate student behavior in activities. Widening is done by combining the space above the drainage to meet the ideal width for performance. Existing conditions of the tracks still make it possible to make the paths more comfortable for student walking activities.

Figure 7.13 Existing width of campus sidewalk

7.2.3 Dominant Factors of Student Satisfaction with Dimension of Safety

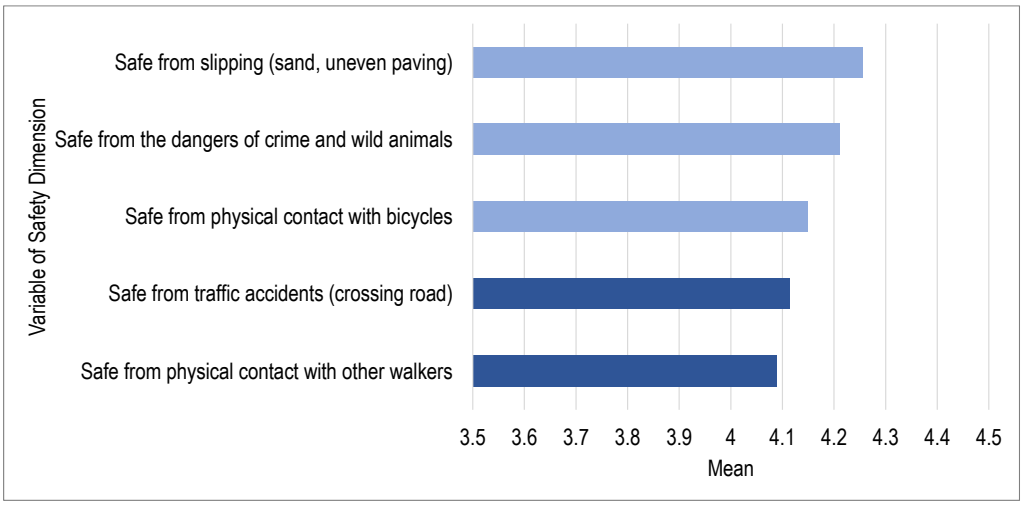


Figure 7.14 Dominant factors of satisfaction level with safety dimension

Figure 7.14 shows the level of student satisfaction with the dimension of safety. The variables safe from slipping and safe from the dangers of crime and wild animals are the dominant variables with which the students feel satisfied. The safe from slipping variable is the second dominant factor in the level of student interest (see Figure 6.6). That is, the relationship between the level of importance and satisfaction in these variables tend to be linear. Thus, the conditions with respect to this variable tend to be good. In the safe from the dangers of crime and wild animals variables, the importance level is third. That is, the relationship between the level of importance and satisfaction in these variables tends to be linear. Thus, the conditions in this variable also tend to be good.

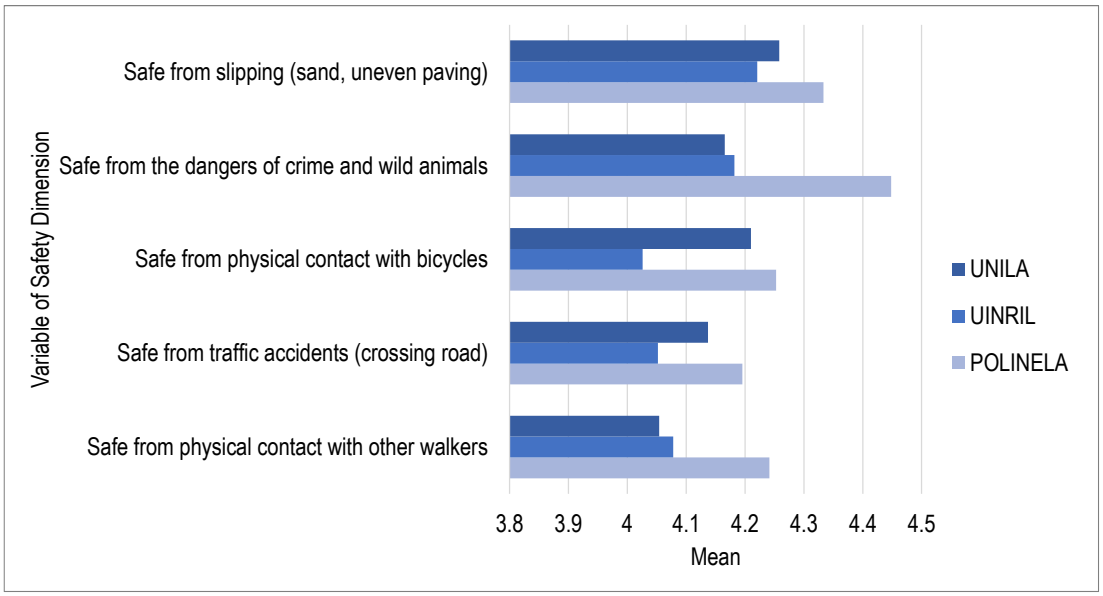


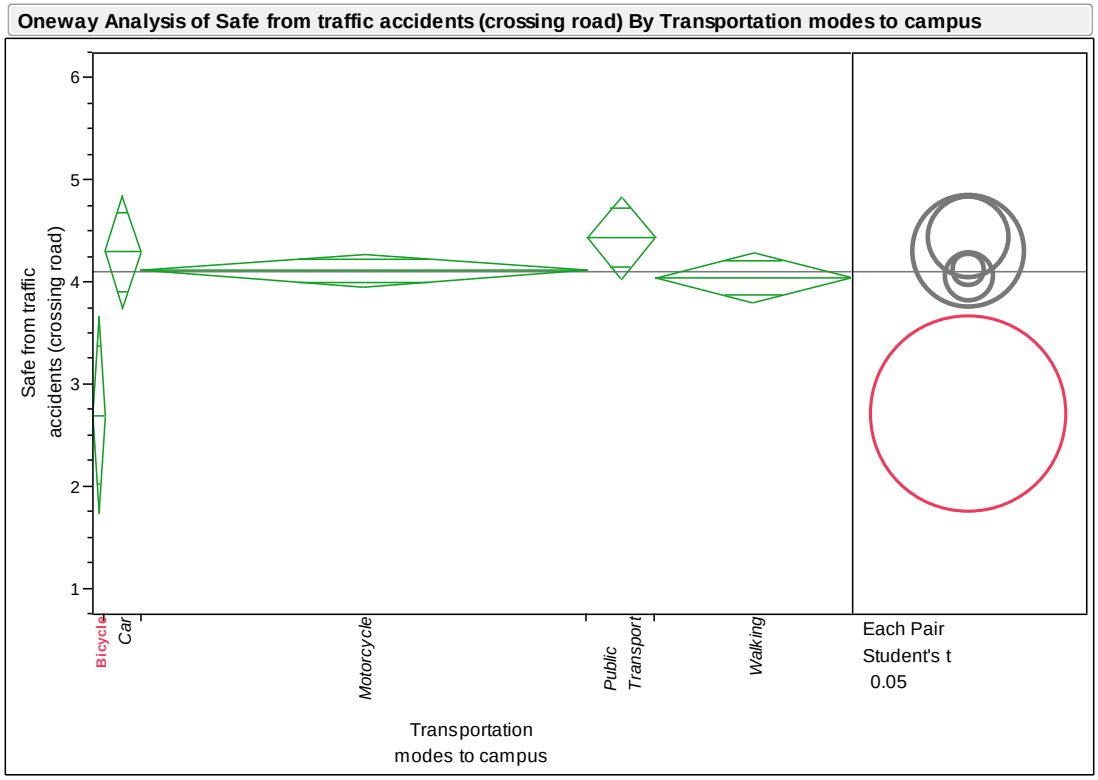
Figure 7.15 Dominant factors of satisfaction level with safety dimension on the three campuses

The least dominant variable (safe from physical contact with the other walker) is fifth in the order of the level of importance (lowest). That is, students have low expectations along with a low level of satisfaction. Thus, this is not a priority in improving security conditions. The second lowest dominant variable (safe from traffic accidents) is of the greatest importance. Thus, students notice a large gap with this variable. In other words, the level of student satisfaction has not reached their expectations. Thus, improving this condition is a priority in improving the quality of sidewalks on campus.

Figure 7.11 shows the differences in satisfaction levels with the variable safe from traffic accident based on the mode of transportation used. The lowest level occurs in students who use bicycles. This is because they use the same lanes as motorized vehicles when cycling. Thus, their level of perceived security is low; users of other modes of transport tend to have the same perception of security.

A strategy to improve student satisfaction can be done through design and non-design efforts. Efforts with respect to design can be made by creating special bicycle paths, adjusting road materials and zebra crossing areas. The making of special bicycle lanes is a priority. Although the number of bicycle users is still small, their safety is a significant factor that should be addressed. Adjustment of

road material can be done by replacing materials with those that cause vehicles to slow down. A textured material that crosses the direction of the road can be used for this. Material textures can be adjusted to achieve the required slowdown. Adjustment of the zebra crossing areas can be done by elevating the area around the zebra crossing (before and after) to slow vehicles down. Non-design efforts can be achieved by posting maximum speeds on campus and by adding more traffic signs.



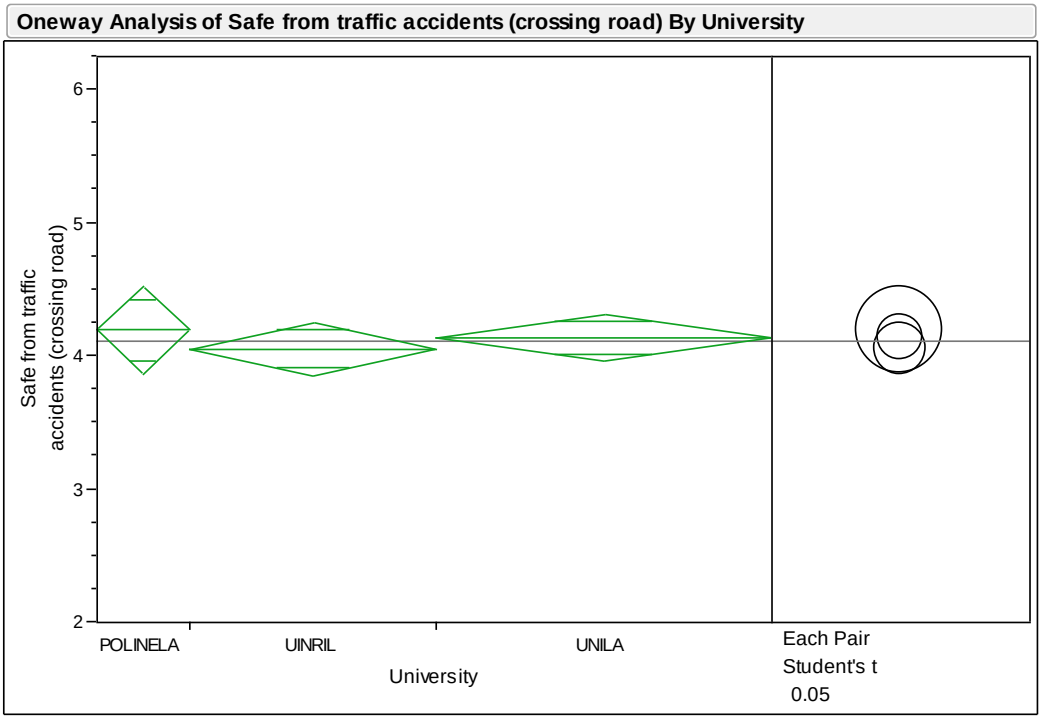
Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
Bicycle	10	2.70000	0.48945	1.7388	3.6612
Car	30	4.30000	0.28259	3.7451	4.8549
Motorcycle	371	4.11590	0.08036	3.9581	4.2737
Public Transport	57	4.43860	0.20501	4.0360	4.8412
Walking	164	4.04878	0.12086	3.8114	4.2861

Figure 7.16 ANOVA between transportation mode and safe from traffic accident

Figure 7.17 shows the differences in satisfaction levels on the three campuses for the variable safe from traffic accident. A significance value in this analysis is more than 0.05, so all three campuses tend to have the same perception of this variable. Thus, the three campuses need an increase in these variables to achieve adequate lane quality.



Oneway Anova

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
POLINELA	87	4.19540	0.16711	3.8672	4.5236
UINRIL	231	4.05195	0.10255	3.8506	4.2533
UNILA	314	4.13694	0.08796	3.9642	4.3097

Figure 7.17 ANOVA between university and safe from traffic accident

7.2.4 Dominant Factors of Student Satisfaction with Sensory Dimension

Figure 7.18 shows the dominant factors of student satisfaction with the sensory dimension. The dominant factors include the following variables: absence of unpleasant smell, pavement cleanliness, and air cleanliness. The variables absence of unpleasant smell and pavement cleanliness are the two dominant variables at the level of student interest (see Figure 6.8). That is, the achievement of satisfaction with both variables tends to be good and needs to be maintained. The variable air cleanliness is fourth in level of importance. That is, the level of importance is lower than the level of satisfaction. Thus, this condition is considered to have exceeded student expectations.

Figure 7.19 shows that the dominant factors with the lowest levels of satisfaction are the variables adequacy of light at night, visual attractiveness, and protection from weather conditions. The adequacy of light at night variable is third in level of importance (see Figure 6.8). This means that students consider these variables important, but they feel dissatisfied with them. Thus, these variables are priorities in terms of improvement. Nowadays students tend to feel uncomfortable when walking at night because a path with these features does not exist (see Figure 7.20). This is felt by the students of the class of 2016 and students who are very active in organizations because they tend to go home

nightly. Thus, the pathway needs to be equipped with artificial lighting to facilitate students walking at night. With respect to the university variables, it is the UNILA students who most often come home late at night.

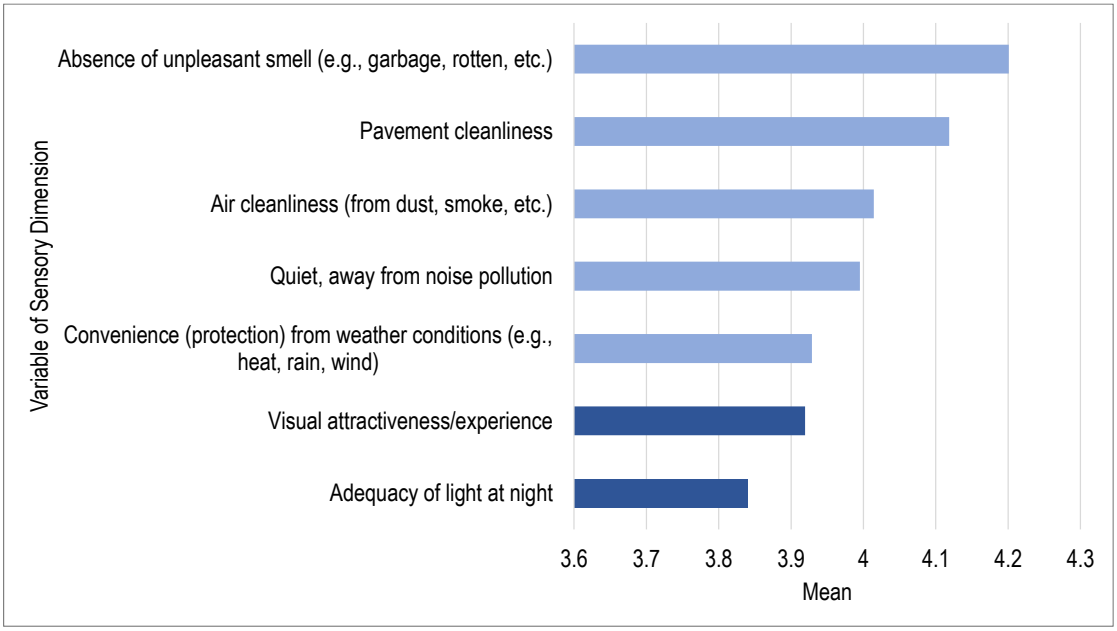


Figure 7.18 Dominant factors of satisfaction level with sensory dimension

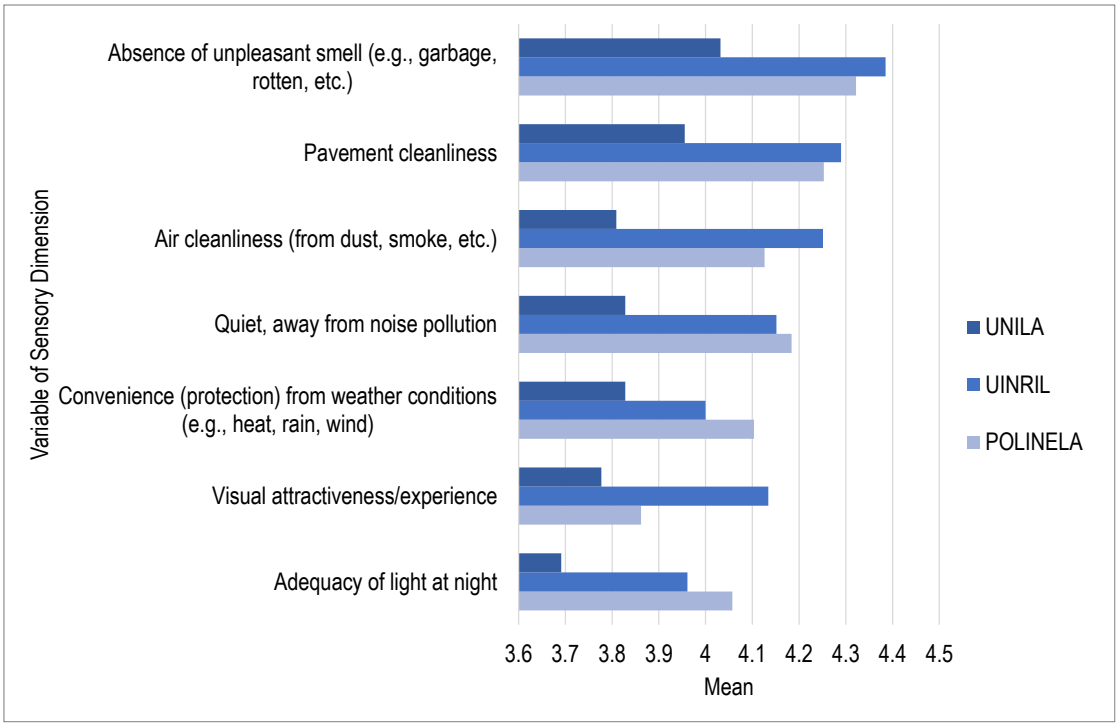


Figure 7.19 Dominant factors of satisfaction level with sensory dimension on the three campus

Figure 7.20 Existing conditions of sidewalks without lamps

The visual attractiveness variable is seventh (lowest) in terms of importance level. This means that students consider this variable unimportant and they feel very dissatisfied with it. Therefore, this variable is not a priority in terms of upgrading. The protection from weather conditions variable is fifth in terms of level of importance. That is, the level of interest and satisfaction tend to be the same; so, this variable belongs to the category of variables that are not a priority.

7.2.5 Dominant Factors of Student Satisfaction with Amenities Dimension

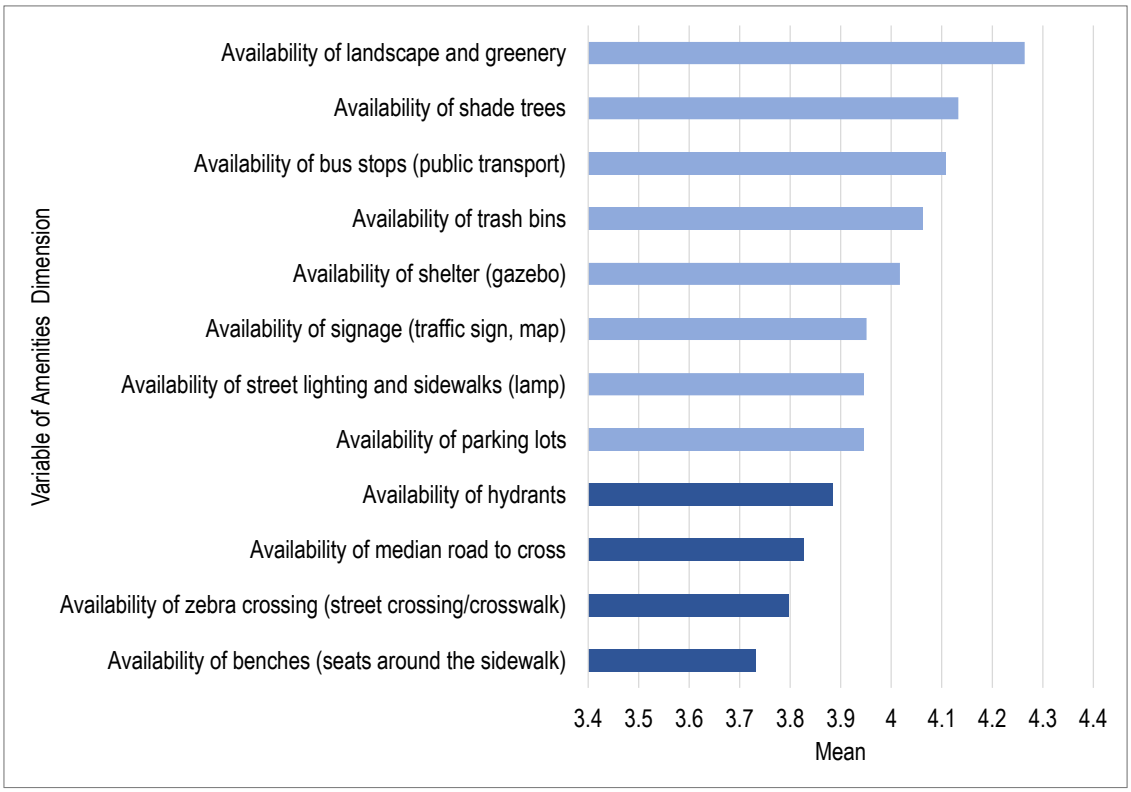


Figure 7.21 Dominant factors of satisfaction level with amenities dimension

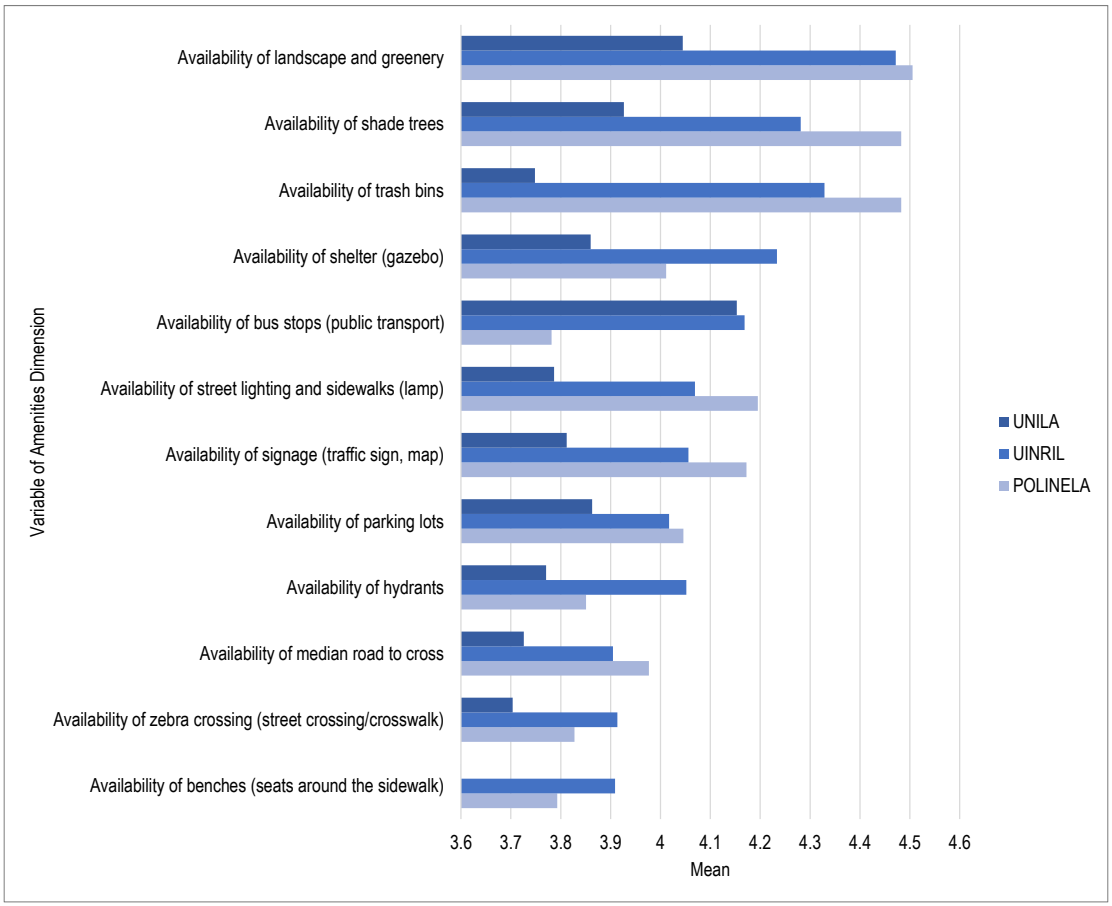
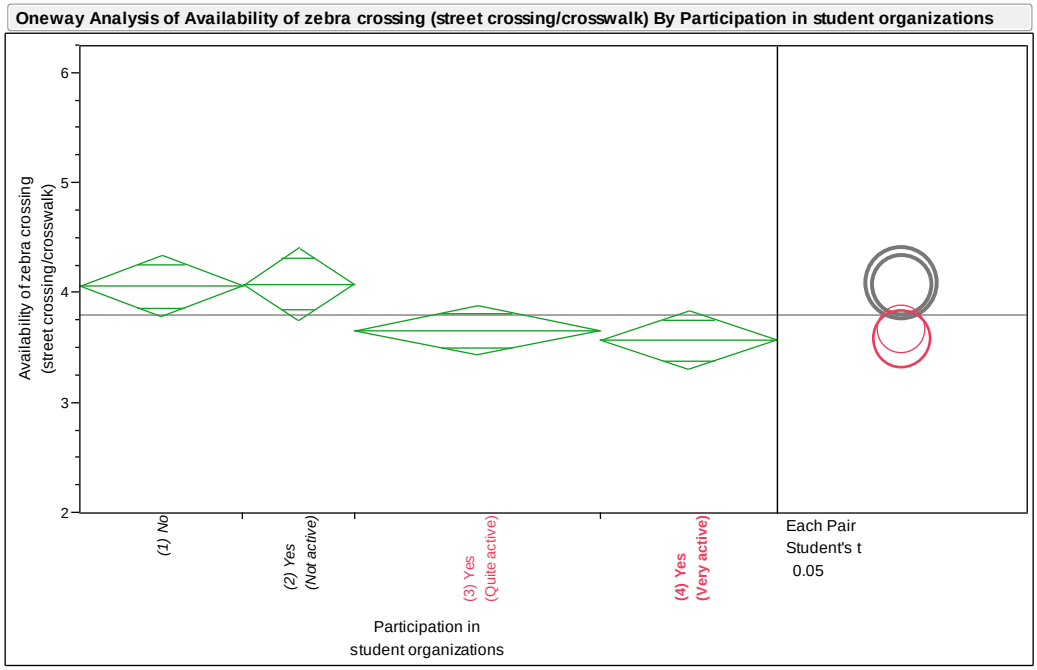


Figure 7.22 Dominant factors of satisfaction level with amenities dimension

Figure 7.21 shows the dominant factors of student satisfaction levels with the dimension of amenities. The dominant factors include the variables availability of landscape and greenery, availability of shade trees, and availability of bus stops. The variable availability of landscape and greenery is the sixth dominant factor for student interest level (Figure 6.10). That is, this variable has an exceeds student expectations.

For the variable availability of shade trees, its importance level is fifth. Thus, the condition of this variable is also exaggerated because the level of importance is lower than the level of the client. At the third level of satisfaction, the availability of bus stops, is seventh in importance. Thus, the condition of this variable is also an exaggerated one because the level of importance is lower than the level of the client.



Oneway Anova

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Participation in student organizations	3	30.9145	10.3048	3.5613	0.0141*
Error	628	1817.1614	2.8936		
C. Total	631	1848.0759			

Means for Oneway Anova

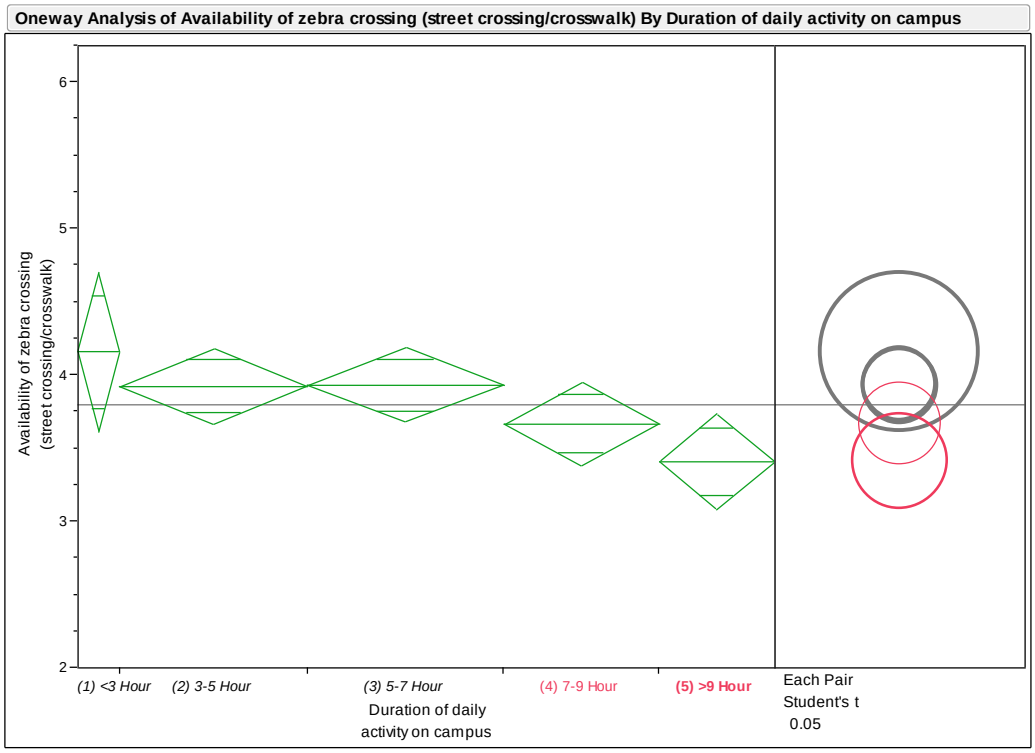
Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) No	148	4.06081	0.13983	3.7862	4.3354
(2) Yes (Not active)	101	4.07921	0.16926	3.7468	4.4116
(3) Yes (Quite active)	223	3.65919	0.11391	3.4355	3.8829
(4) Yes (Very active)	160	3.56875	0.13448	3.3047	3.8328

Figure 7.23 ANOVA between availability of zebra crossing and participation in student organizations

Figure 7.15 also shows the dominant factors with lowest levels of satisfaction level, i.e., availability of benches, availability of zebra crossing, availability of median road to cross, and availability of hydrants. The variable availability of benches is tenth in terms of the order of importance (see Figure 6.10). This means that students do not consider this variable a priority. The second lowest variable, availability of zebra crossing, is third in terms of importance. That is, this variable is an important one for improvement because its fulfillment will help to improve the current security conditions.

Figure 7.23 shows the differences in satisfaction level an participation in student organizations with respect to the variable availability of zebra crossing. Students who are active and very active in organizations tend to feel dissatisfied compared to students who are not active and do not participate at all. Students who tend to be actively involved in organizations are those at UNILA and POLINELA. Thus, both campuses have a close relationship with low levels of satisfaction with the availability of zebra crossing. Figure 7.24 shows the differences in satisfaction level and duration of daily activity on

campus with respect to availability of zebra crossing. This means that students who move more tend to be dissatisfied with this variable. Duration of daily activities on campus over 9 hours a day corresponds to the activities of POLINELA students while a duration of 7–9 hours a day corresponds to UNILA students (see Figure 5.16). This means that the proportion of POLINELA students who are not satisfied is greater than that for students on other campuses.



Oneway Anova

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Duration of daily activity on campus	4	29.1026	7.27565	2.5079	0.0410*
Error	627	1818.9733	2.90107		
C. Total	631	1848.0759			

Means for Oneway Anova

Level	Number	Mean	Std Error	Lower 95%	Upper 95%
(1) <3 Hour	38	4.15789	0.27630	3.6153	4.7005
(2) 3-5 Hour	170	3.92353	0.13063	3.6670	4.1801
(3) 5-7 Hour	178	3.93258	0.12766	3.6819	4.1833
(4) 7-9 Hour	141	3.66667	0.14344	3.3850	3.9483
(5) >9 Hour	105	3.40952	0.16622	3.0831	3.7359

Figure 7.24 ANOVA between availability of zebra crossing and duration of daily activity on campus

The third lowest variable (availability of median road to cross) is fourth in terms of level of importance. That is, this variable is important with respect to improvement. Although, in the existing conditions found for this variable, most of the areas on the UINRIL and POLINELA campuses have not achieved adequate performance. Furthermore, the fourth lowest variable (availability of hydrants)

is ninth in importance. That is, the order of levels between importance and satisfaction is the same. Thus, this variable is also not a priority.

In this section, this study identifies six dominant variables which are perceived as important but are felt to be unsatisfactory by students. These seven variables include: (1) periodic maintenance variables, (2) completeness of supporting tools for disability, (3) width of path, (4) safe from traffic accidents, (5) adequacy of light at night, and (6) availability of zebra crossing.

7.3 Correlation Analysis of Five dimensions Variable of Satisfaction and Overall Satisfaction

This section is a correlation analysis between the five dimensions variable of satisfaction and satisfaction in each dimension. In addition, a correlation analysis between dimensional satisfaction and overall satisfaction is also performed.

7.3.1 Correlation Analysis of Variables of Quality Dimension and Overall Satisfaction

Table 7.1 is a recapitulation of a multivariate analysis of quality dimensions variables and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of correlation relationship is between 0.81–0.83 (very strong correlation). Meanwhile, the positive correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a variable increases, then total satisfaction also increases.

Table 7.1 Multivariate Analysis between Overall satisfactions on the quality dimension by variable

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction on the quality dimension	Absence of obstruction (e.g., obstacle, pole, hole, etc.)	0.83	632	<.0001
	Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	0.82	632	<.0001
	Roughness level of material surface (not slippery)	0.81	632	<.0001
	Durability of path material (strong, not easily broken)	0.81	632	<.0001

7.3.2 Correlation Analysis of Variables of Design Dimension and Overall Satisfaction

Table 7.2 is a recapitulation of a multivariate analysis of design dimension variables and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of the correlation relationship is very strong at 0.81–0.86, while the strong correlation value is between 0.74–0.76. The

positive correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a variable increases, then total satisfaction also increases.

Table 7.2 Multivariate Analysis between Overall satisfactions on the design dimension by variable

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction on the design dimension	Aesthetic (neatness, colored, patterned)	0.86	632	<.0001
	Presence of barrier from vehicle (e.g., fence, bollard)	0.83	632	<.0001
	Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)	0.82	632	<.0001
	Width of path	0.81	632	<.0001
	Connectivity with other paths and facilities (parking area, bus stop, etc.)	0.81	632	<.0001
	Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.)	0.80	632	<.0001
	Continuity of path without significant elevation difference (up/down repeatedly)	0.76	632	<.0001
	Elevation of the sidewalk higher than the road surface	0.74	632	<.0001

7.3.3 Correlation Analysis of Variables of Safety Dimension and Overall Satisfaction

Table 7.3 is a recapitulation of multivariate analysis of the quality dimension variables and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of the correlation relationship is between 0.81–0.88 (very strong correlation) and 0.8 (strong). The positive correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a variable increases, then total satisfaction also increases.

Table 7.3 Multivariate Analysis between Overall satisfactions on the safety dimension by variable

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction on the safety dimension	Safe from slipping (sand, uneven paving)	0.88	632	<.0001
	Safe from traffic accidents (crossing road)	0.87	632	<.0001
	Safe from physical contact with bicycles	0.84	632	<.0001
	Safe from physical contact with other walkers	0.83	632	<.0001
	Safe from the dangers of crime and wild animals	0.80	632	<.0001

7.3.4 Correlation Analysis of Variables of Sensory Dimension and Overall Satisfaction

Table 7.4 Multivariate Analysis between Overall satisfactions on the sensory dimension by variable

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction on the sensory dimension	Absence of unpleasant smell (e.g., garbage, rotten, etc.)	0.89	632	<.0001
	Air cleanliness (from dust, smoke, etc.)	0.87	632	<.0001
	Quiet, away from noise pollution	0.86	632	<.0001
	Pavement cleanliness	0.85	632	<.0001
	Adequacy of light at night	0.83	632	<.0001
	Convenience (protection) from weather conditions (e.g., heat, rain, wind)	0.81	632	<.0001
	Visual attractiveness/experience	0.78	632	<.0001

Table 7.4 is a multivariate analysis recapitulation of the quality dimension variables and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of the correlation

relationship is between 0.81–0.89 (very strong correlation) and 0.78 (strong). The positive correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a variable increases, then total satisfaction also increases.

7.3.5 Correlation Analysis of Variable of Amenities Dimension and Overall Satisfaction

Table 7.5 Multivariate Analysis between Overall satisfactions on the amenities dimension by variable

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction on the amenities dimension	Availability of hydrants	0.86	632	<.0001
	Availability of parking lots	0.85	632	<.0001
	Availability of zebra crossing (street crossing/crosswalk)	0.84	632	<.0001
	Availability of street lighting and sidewalks (lamp)	0.84	632	<.0001
	Availability of median road to cross	0.83	632	<.0001
	Availability of signage (traffic sign, map)	0.83	632	<.0001
	Availability of trash bins	0.82	632	<.0001
	Availability of bus stops (public transport)	0.81	632	<.0001
	Availability of benches (seats around the sidewalk)	0.81	632	<.0001
	Availability of landscape and greenery	0.80	632	<.0001
	Availability of shade trees	0.80	632	<.0001
	Availability of shelter (gazebo)	0.79	632	<.0001

Table 7.5 is a multivariate analysis recapitulation of the quality dimension variables and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of the correlation relationship is between 0.81–0.86 (very strong correlation) and 0.79–0.80 (strong). The positive

correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a variable increases, then total satisfaction also increases.

7.3.6 Correlation Analysis of Satisfaction Dimension and Overall Satisfaction

Table 7.6 is a multivariate analysis recapitulation of the satisfaction dimension and total satisfaction. The results show that all significant relationships are less than 0.05. That is, all dimensional satisfaction has a relationship with total satisfaction. The value of the correlation relationship is between 0.53–0.59 (moderate correlation). The positive correlation value means that the relationship is unidirectional. That is, if the value of satisfaction with a dimension increases, then total satisfaction also increases.

Table 7.6 Multivariate Analysis between Overall satisfactions
by variable Overall satisfaction on the dimension

Variable	by Variable	Correlation	Count	Signif Prob
Overall satisfaction	Overall satisfaction on the amenities dimension	0.59	632	<.0001
	Overall satisfaction on the safety dimension	0.58	632	<.0001
	Overall satisfaction on the sensory dimension	0.57	632	<.0001
	Overall satisfaction on the design dimension	0.55	632	<.0001
	Overall satisfaction on the quality dimension	0.53	632	<.0001

7.4 The Effect of Five dimensions Variable on Overall Satisfaction

Stepwise Fit

Response: Overall satisfaction

Stepwise Regression Control

Prob to Enter 0.250
Prob to Leave 0.100
Direction: Forward

Current Estimates

SSE	DFE	MSE	RSquare	RSquare Adj	Cp	AIC
776.22284	626	1.2399726	0.3829	0.3780	5.7651743	141.9078

Lock	Entered	Parameter	Estimate	nDF	SS	"F Ratio"	"Prob>F"
☑	☑	Intercept	1.16904544	1	0	0.000	1.0000
☐	☐	Durability of path material (strong, not easily broken)	0	1	0.06279	0.051	0.8222
☐	☐	Roughness level of material surface (not slippery)	0	1	0.010212	0.008	0.9278
☐	☐	Absence of obstruction (e.g., obstacle, pole, hole, etc.)	0	1	0.018133	0.015	0.9039
☐	☐	Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	0	1	0.034083	0.027	0.8685
☐	☐	Width of path	0	1	2.346619	1.895	0.1691
☐	☑	Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.)	0.13914162	1	8.225267	6.633	0.0102
☐	☑	Continuity of path without significant elevation difference (up/down repeatedly)	0.08643317	1	3.310034	2.669	0.1028
☐	☐	Elevation of the sidewalk higher than the road surface	0	1	0.460267	0.371	0.5428
☐	☐	Connectivity with other paths and facilities (parking area, bus stop, etc.)	0	1	1.175657	0.948	0.3306
☐	☐	Aesthetic (neatness, colored, patterned)	0	1	0.003128	0.003	0.9600
☐	☐	Presence of barrier from vehicle (e.g., fence, bollard)	0	1	2.948039	2.383	0.1232
☐	☐	Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)	0	1	8.05052	6.550	0.0107
☐	☐	Safe from the dangers of crime and wild animals	0	1	0.013582	0.011	0.9167
☐	☐	Safe from physical contact with other walkers	0	1	1.220647	0.984	0.3215
☐	☐	Safe from physical contact with bicycles	0	1	1.083571	0.874	0.3503
☐	☑	Safe from traffic accidents (crossing road)	0.09384218	1	4.242842	3.422	0.0648
☐	☐	Safe from slipping (sand, uneven paving)	0	1	0.016801	0.014	0.9074
☐	☐	Convenience (protection) from weather conditions (e.g., heat, rain, wind)	0	1	0.030977	0.025	0.8746
☐	☐	Pavement cleanliness	0	1	0.017419	0.014	0.9058
☐	☑	Visual attractiveness/experience	0.13924326	1	12.13617	9.787	0.0018
☐	☐	Adequacy of light at night	0	1	4.226006	3.421	0.0648
☐	☐	Quiet, away from noise pollution	0	1	1.961851	1.584	0.2087
☐	☐	Air cleanliness (from dust, smoke, etc.)	0	1	1.118829	0.902	0.3426
☐	☐	Absence of unpleasant smell (e.g., garbage, rotten, etc.)	0	1	0.26365	0.212	0.6451
☐	☐	Availability of landscape and greenery	0	1	2.847559	2.301	0.1298
☐	☐	Availability of shade trees	0	1	0.831891	0.671	0.4132
☐	☐	Availability of shelter (gazebo)	0	1	0.928937	0.749	0.3872
☐	☐	Availability of benches (seats around the sidewalk)	0	1	0.756273	0.610	0.4353
☐	☐	Availability of trash bins	0	1	1.837316	1.483	0.2238
☐	☐	Availability of signage (traffic sign, map)	0	1	0.092456	0.074	0.7851
☐	☐	Availability of street lighting and sidewalks (lamp)	0	1	0.418156	0.337	0.5618
☐	☐	Availability of zebra crossing (street crossing/crosswalk)	0	1	3.105698	2.511	0.1136
☐	☐	Availability of median road to cross	0	1	0.034271	0.028	0.8681
☐	☑	Availability of parking lots	0.18955671	1	21.5025	17.341	0.0000
☐	☐	Availability of bus stops (public transport)	0	1	1.286435	1.038	0.3088
☐	☐	Availability of hydrants	0	1	0.046573	0.038	0.8465

Figure 7.25 Stepwise regression analysis

Regression analysis (stepwise) is used to determine the variables that affect the overall satisfaction. Variables that have significance values of more than five percent (>0.05) are incrementally increased. The expenditure of variables starts with those with the greatest significance values to the remaining variables that have only significant values of less than five percent (<0.05).Based on Figure 7.25, the variables that have an effect on total satisfaction are: variable of type of material on the pedestrian path, continuity path without significant elevation differences, safe from traffic accident, visual attractiveness, and availability of parking lots. The most influential variable on overall satisfaction is the variable availability of parking lots. That is, the existence of these variables greatly affects overall satisfaction.

7.5 Importance-Performance Analysis (IPA) of Evaluation of Campus Sidewalks

The following importance-performance analysis is used to determine the priority of quassessment variables that need to be improved. The discussion in this section focuses only on quadrant A which is the priority for improvement. Quadrant A has a high importance level, but a low level of satisfaction. The x-axis is the axis for the performance level (satisfaction), while the y-axis is the axis for the level of interest.

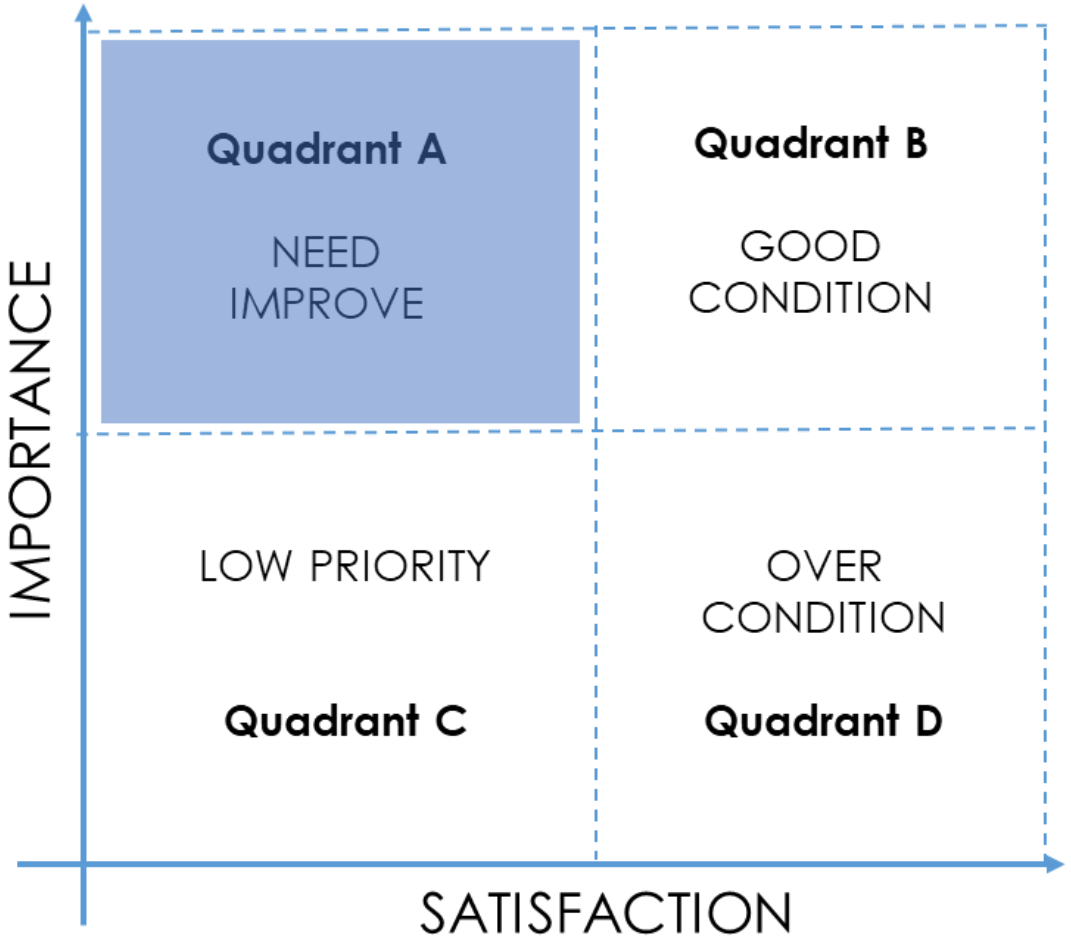


Figure 7.26 Importance-performance analysis
of evaluation of campus sidewalks

7.5.1 Comparison of Importance-Performance Analysis on three Campus

Table 7.7 Comparison of Importance-Performance Analysis shows the difference in importance-performance analysis on each campus. The authors found three priority levels in improving sidewalk quality in public campus namely gold improvement priority (GIP), silver improvement priority (SIP), and bronze improvement priority (BIP).

Table 7.7 Comparison of Importance-Performance Analysis five dimensions

No	Variable	All Campus	UNILA	UINRIL	POLINELA
1	Durability of path material (strong, not easily broken)				
2	Roughness level of material surface (not slippery)				
3	Absence of obstruction (e.g., obstacle, pole, hole, etc.)				
4	Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)				
5	Width of path			▽	▽
6	Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.)			▼	
7	Elevation of the sidewalk higher than the road surface				
8	Continuity of path without significant elevation difference (up/down repeatedly)				
9	Connectivity with other paths and facilities (parking area, bus stop, etc.)				
10	Aesthetic (neatness, colored, patterned)				
11	Presence of barrier from vehicle (e.g., fence, bollard)				
12	Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)		●		
13	Safe from the dangers of crime and wild animals				
14	Safe from physical contact with other walkers				
15	Safe from physical contact with bicycles			▼	
16	Safe from traffic accidents (crossing road);			▼	
17	Safe from slipping (sand, uneven paving),				
18	Convenience (protection) from weather conditions (e.g., heat, rain, wind);	⊙	⊙	⊙	⊙
19	Pavement cleanliness;		●		
20	Visual attractiveness/experience				
21	Adequacy of light at night	⊙	⊙	⊙	⊙
22	Quiet away from noise pollution				
23	Air cleanliness (from dust, smoke, etc.);		□		□
24	Absence of unpleasant smell (e.g., garbage, rotten, etc.)				
25	Availability of landscape and greenery;				
26	Availability of shade trees;		●		
27	Availability of shelter (gazebo);				■
28	Availability of benches (seats around the sidewalk);				■
29	Availability of trash bins		●		
30	Availability of signage (traffic sign, map);	◆	○	○	
31	Availability of street lighting and sidewalks (lamp);	◆	○	○	
32	Availability of zebra crossing (street crossing/crosswalk);	⊙	⊙	⊙	⊙
33	Availability of median road to cross ;	⊙	⊙	⊙	⊙
34	Availability of parking lots;			▼	
35	Availability of bus stops (public transport);				
36	Availability of hydrants			▼	

Legend:

◆ All campus
● UNILA
▼ UINRIL
■ POLINELA
⊙ Variable of Three Campus
○ Variable of UNILA and UINRIL
▽ Variable of UINRIL and POLINELA
□ Variable of UNILA and POLINELA

GIP is a consistent variable in quadrant A on all three campuses. These variables are Convenience variables (protection) from weather conditions (sensory dimension), Adequacy of light at night (sensory dimension), Availability of zebra crossing (amenities dimension), and Availability of median road to cross (amenities dimension). Thus, these four variables are the main variables that need to be improved in order to improve the quality of the campus sidewalk.

SIP is a consistent variable residing in quadrant A on two campuses. These variables are Width of path (design dimension), Air cleanliness (sensory dimension), Availability of signage (amenities dimension), and Availability of street lighting and sidewalks (amenities dimension). Thus, these four variables are secondary variables to improve the sidewalk quality of the campus.

BIP is a consistent variable located in A quadrant on only one campus. These variables are the Type of material variables on the pedestrian path (design dimension), Completeness of supporting tools for disability (design dimension), Safe from physical contact with bicycles (safety dimension), Safe from traffic accidents (safety dimension), Pavement cleanliness (sensory dimension), Availability of shade trees (amenities dimension), Availability of trash bins (amenities dimension), Availability of parking lots (amenities dimension), Availability of hydrants (amenities dimension). Thus, these eight variables are tertiary variables to improve the quality of the campus sidewalk.

7.5.2 Comparison IPA on five dimension five dimensions

The following sections are the different IPAs that occur in each dimension. This analysis was conducted to obtain a quality improvement strategy in each dimension. In the quality dimension, this research found two silver improvement priority that is variable of Durability of path material and Periodic maintenance (Table 7.8). Improvement on these two variables can be done on all three campuses although only classy silver. This is because both of these variables are in quadrant A on the three campus analysis.

Table 7.8 Comparison of Importance-Performance Analysis at Quality Dimension

No	Variable	Three Campuses	UNILA	UINRIL	POLINELA
1	Durability of path material (strong, not easily broken)	●		●	●
2	Roughness level of material surface (not slippery)				
3	Absence of obstruction (e.g., obstacle, pole, hole, etc.)				
4	Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)	●	●		●

In the design dimension, this research found one gold improvement priority that is on Completeness of supporting tools for disability, and two bronze improvement priority that is on Width of path variable and Connectivity with other paths and facilities (Table 7.9).

Table 7.9 Comparison of Importance-Performance Analysis at Design Dimension

No	Variable	Three Campuses	UNILA	UINRIL	POLINELA
1	Width of path			●	
2	Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.)				
3	Elevation of the sidewalk higher than the road surface				
4	Continuity of path without significant elevation difference (up/down repeatedly)				
5	Connectivity with other paths and facilities (parking area, bus stop, etc.)				●
6	Aesthetic (neatness, colored, patterned)				
7	Presence of barrier from vehicle (e.g., fence, bollard)				
8	Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)	●	●	●	●

In safety dimension, this research find one gold improvement priority that is on variable of Safe from traffic accidents (Table 7.10). This indicates that this variable is a very important variable to be improved because it concerns security and safety.

Table 7.10 Comparison of Importance-Performance Analysis at Safety Dimension

No	Variable	Three Campuses	UNILA	UINRIL	POLINELA
1	Safe from the dangers of crime and wild animals				
2	Safe from physical contact with other walkers				
3	Safe from physical contact with bicycles				
4	Safe from traffic accidents (crossing road);	●	●	●	●
5	Safe from slipping (sand, uneven paving),				

In sensory dimension, this research found one gold improvement priority that is Adequacy of light at night variable, one silver improvement priority that is variable of Convenience (protection) from weather conditions, and one bronze improvement priority is on Air cleanliness variable (Table 7.11). Improvement on these three variables can be done on all three campuses although two of them are only classy silver and bronze. This is because the two variables are in quadrant A in the analysis on three campuses.

Table 7.11 Comparison of Importance-Performance Analysis at Sensory Dimension

No	Variable	Three Campuses	UNILA	UINRIL	POLINELA
1	Convenience (protection) from weather conditions (e.g., heat, rain, wind);	●	●	●	
2	Pavement cleanliness;				
3	Visual attractiveness/experience				
4	Adequacy of light at night	●	●	●	●
5	Quiet, away from noise pollution				
6	Air cleanliness (from dust, smoke, etc.);	●	●		
7	Absence of unpleasant smell (e.g., garbage, rotten, etc.)				

In the design dimension, this research found three silver improvement priority that is on the variable of Availability of street lighting and sidewalks, Availability of zebra crossing, Availability of median road to cross, and two bronze improvement priority that is on Availability of benches and Availability of trash bins (Table 7.12). However, improvements can be made to silver-grade variables because those variables are in quadrant A in the analysis on three campuses.

Table 7.12 Comparison of Importance-Performance Analysis at Amenities Dimension

No	Variable	Three Campuses	UNILA	UINRIL	POLINELA
1	Availability of landscape and greenery;				
2	Availability of shade trees;				
3	Availability of shelter (gazebo);				
4	Availability of benches (seats around the sidewalk);				●
5	Availability of trash bins		●		
6	Availability of signage (traffic sign, map);				

7	Availability of street lighting and sidewalks (lamp);	●	●	●	
8	Availability of zebra crossing (street crossing/crosswalk);	●	●		●
9	Availability of median road to cross ;	●	●		●
10	Availability of parking lots;				
11	Availability of bus stops (public transport);				
12	Availability of hydrants				

7.6 Section Conclusions

This study found six variables with which people felt really dissatisfied: (1) periodic maintenance, (2) completeness of supporting tools for disability, (3) width of path, (4) safe from traffic accidents, (5) adequacy of light at night, and (6) availability of zebra crossing. Another finding was that all five dimensions variables are correlated with overall satisfaction, as well as five particular variables that affect the overall satisfaction: (1) type of material on the pedestrian path, (2) continuity of path without significant elevation differences, (3) safe from traffic accident, (4) visual attractiveness, and (5) availability of parking lots. The authors also found three priority levels in improving sidewalk quality in public campus namely gold improvement priority (GIP), silver improvement priority (SIP), and bronze improvement priority (BIP).

Chapter 8. Conclusions

8.1 Conclusion

Evaluation of satisfaction is an important means to improve the quality of campus sidewalks. This study found a five dimensions evaluation model consisting of dimensions related to quality, design, safety, sensory, and amenities. This model consists of 36 environment variables structured in an organized and holistic manner.

Secondly, this study found that the profile and activities of students on every campus tend to vary with the dominance of the mode of transportation profile. Additionally, the relationship between profile and activity cannot be applied in a linear fashion. That is, every profile and activity for each campus has a distinctive characteristic.

Thirdly, this study found eleven dominant factors that are most considered important by students. Gender and batch profiles are profiles with different perceptions of interest regarding the adequacy of light at night (gender) and safe from traffic accident (batch). In addition, the variable safe from accident is the dominant variable that is most frequently perceived differently on account of the duration of daily activity, the return frequency after 7 p.m., and the frequency of walking.

Fourthly, this study found seven variables with which people are not significantly satisfied: periodic maintenance, completeness of supporting tools for disability, width of path, safe from traffic accidents, adequacy of light at night, and availability of zebra crossing. While type of material on the pedestrian path, continuity of path without significant elevation differences, safe from traffic accident, visual attractiveness, and availability of parking lots are the five variables that affect overall satisfaction with the sidewalk. These findings are limited to populations on the three largest state campuses in Lampung.

8.2 Recommendations and Future Research

Thus, the five dimensions model is an effective model for evaluating sidewalks on campuses, especially on the public campuses in Lampung. Further research is recommended to evaluate private campuses to find out how effective evaluation models can be used. This study also recommends evaluating various campuses, especially in Indonesia, to know the tendencies in variables that affect student satisfaction.

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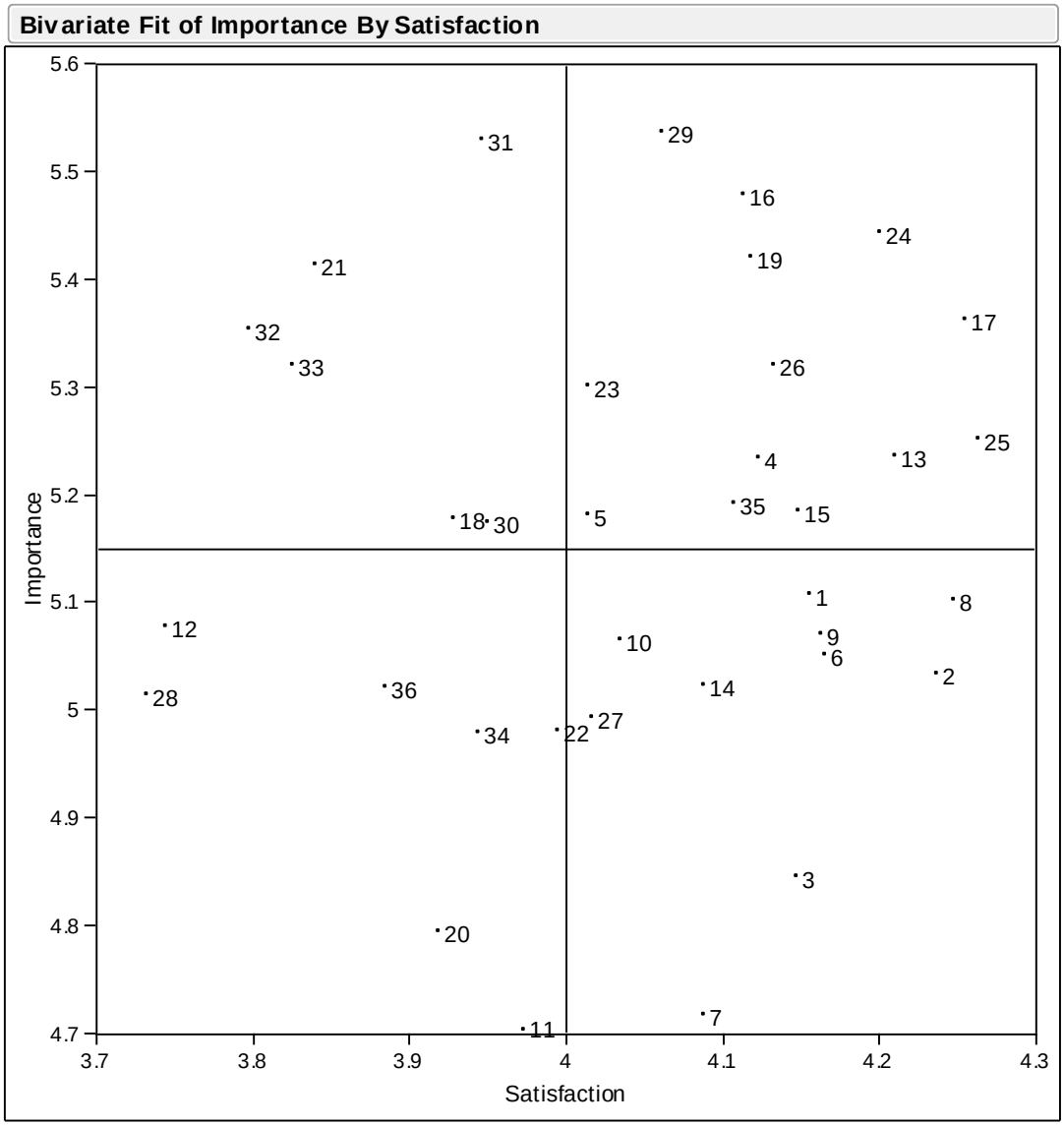
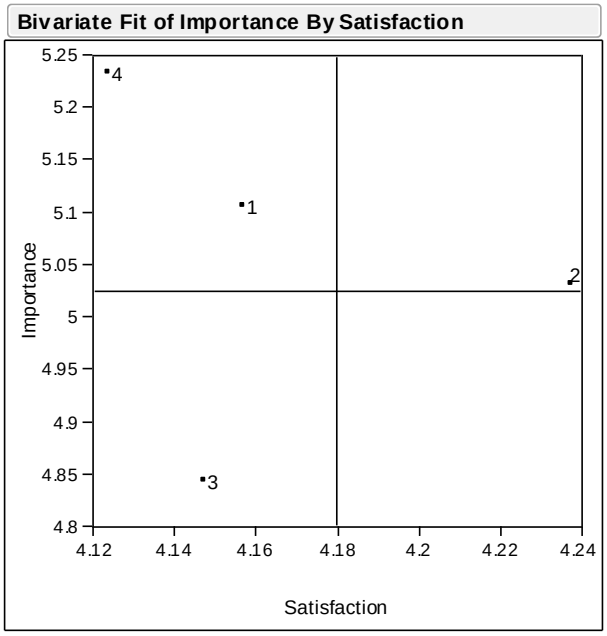
Appendix 1. Importance-Performance Analysis on the Three Campuses



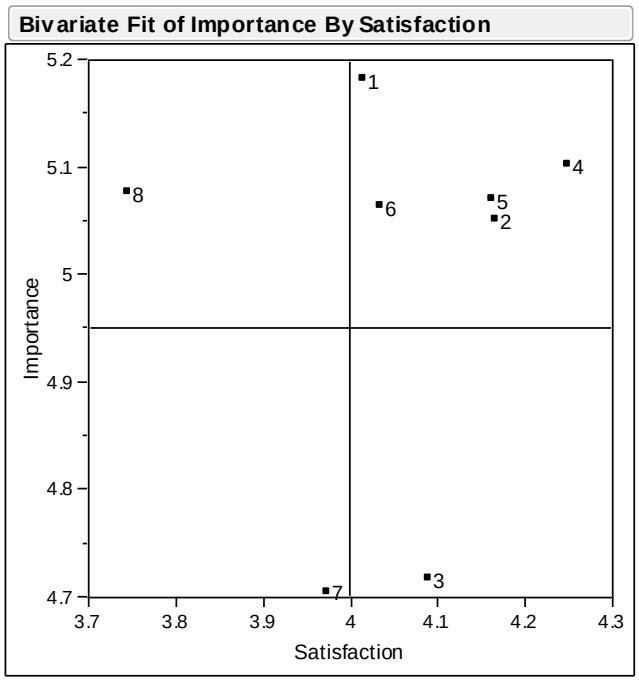
18 Convenience (protection) from weather conditions (e.g., heat, rain, wind); 21 Adequacy of light at night; 30 Availability of signage (traffic sign, map); 31 Availability of street lighting and sidewalks (lamp); 32 Availability of zebra crossing (street crossing/crosswalk); 33 Availability of median road to cross

Quadran A of Importance-performance analysis on the three campuses



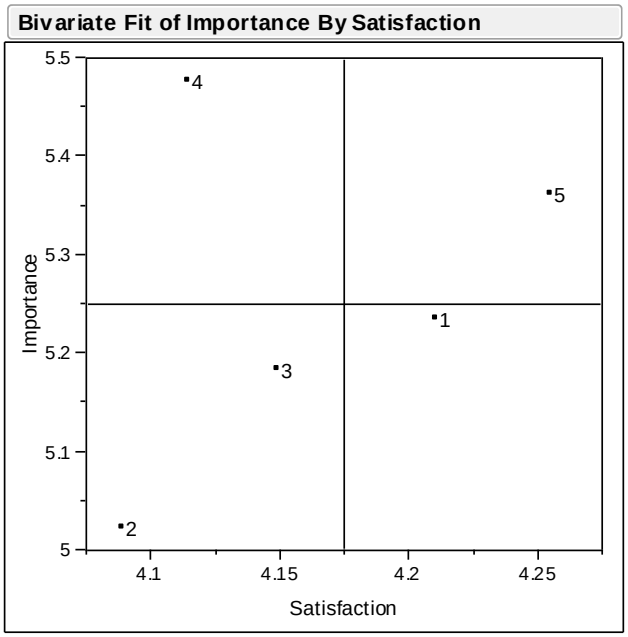
1 Durability of path material (strong, not easily broken);
4 Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)

Quadran A of Importance-performance analysis of quality dimensions on the three campuses



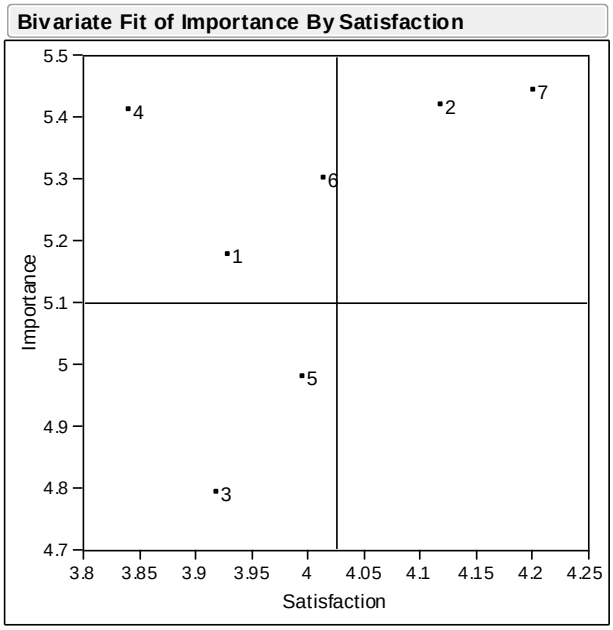
8 Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)

Quadran A of Importance-performance analysis of design dimensions on the three campuses



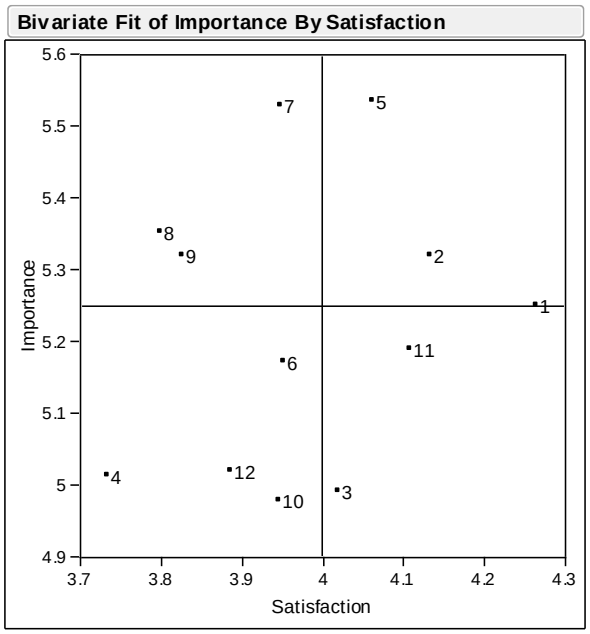
4 Safe from traffic accidents (crossing road)

Quadran A of Importance-performance analysis of safety dimensions on the three campuses



1 Convenience (protection) from weather conditions (e.g., heat, rain, wind);
4 Adequacy of light at night; 6 Air cleanliness (from dust, smoke, etc.)

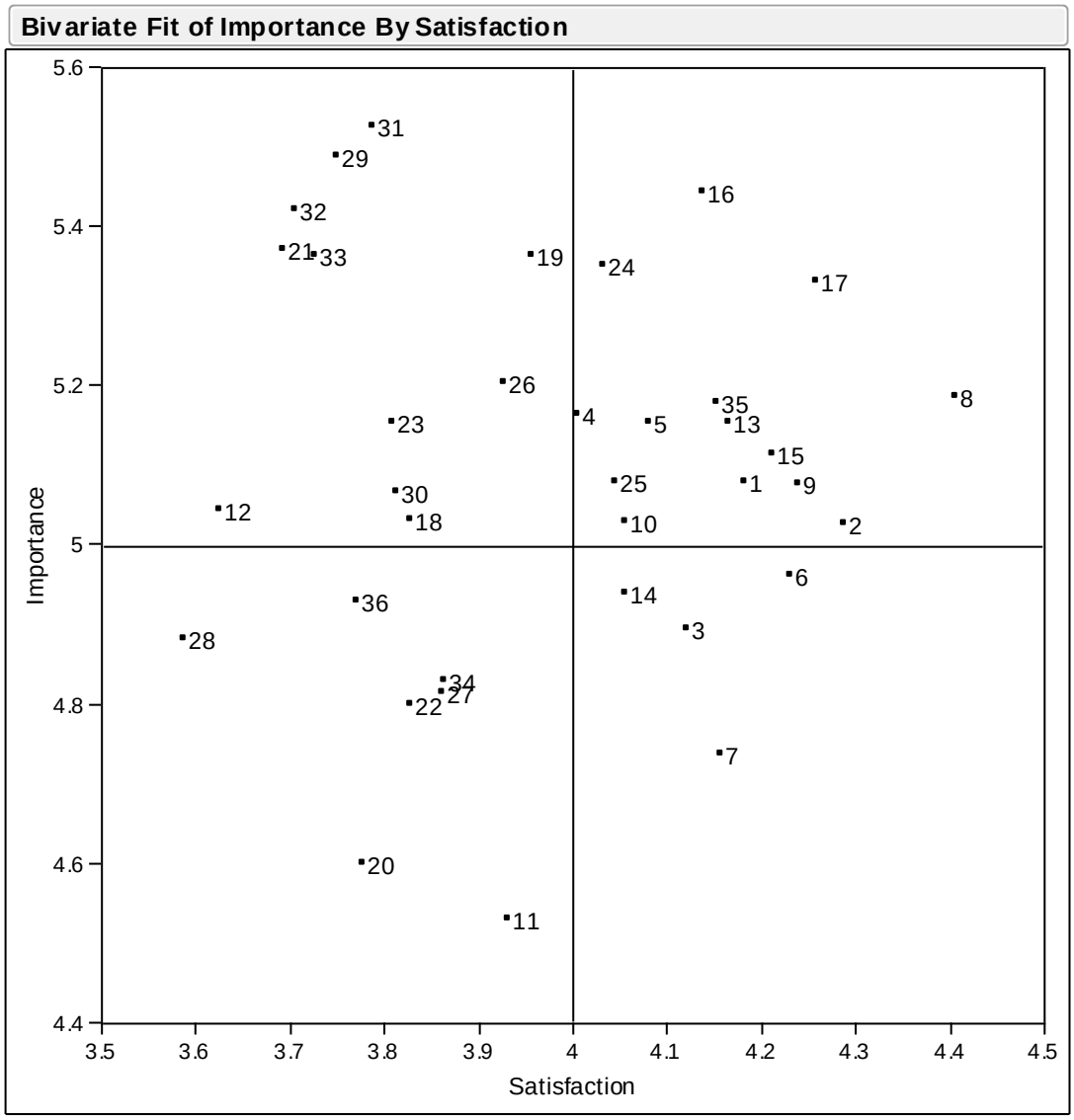
Quadran A of Importance-performance analysis of sensory dimensions on the three campuses



7 Availability of street lighting and sidewalks (lamp);
8 Availability of zebra crossing (street crossing/crosswalk);
9 Availability of median road to cross

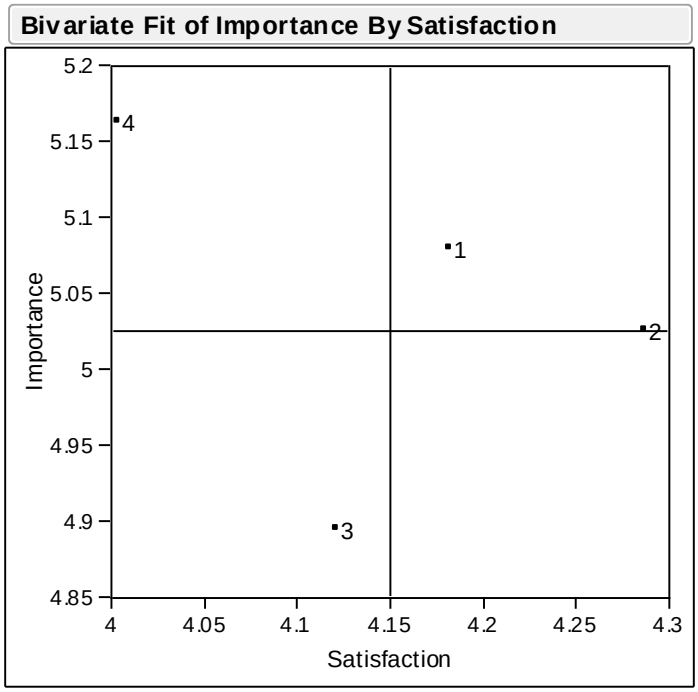
Quadran A of Importance-performance analysis of the amenities dimension on the three campuses

Appendix 2. Importance-Performance Analysis of the UNILA Campus



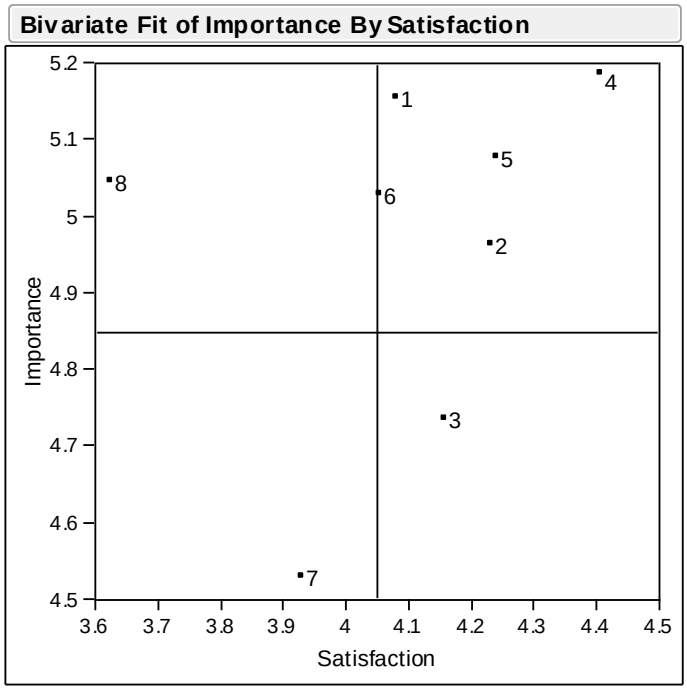
8 Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.), 18 Convenience (protection) from weather conditions (e.g., heat, rain, wind); 19 Pavement cleanliness; 21 Adequacy of light at night; 23 Air cleanliness (from dust, smoke, etc.);26 Availability of shade trees; 29 Availability of trash bins; 30 Availability of signage (traffic sign, map); 31 Availability of street lighting and sidewalks (lamp); 32 Availability of zebra crossing (street crossing/crosswalk); 33 Availability of median road to cross

Quadran A of Importance-performance analysis of the UNILA campus



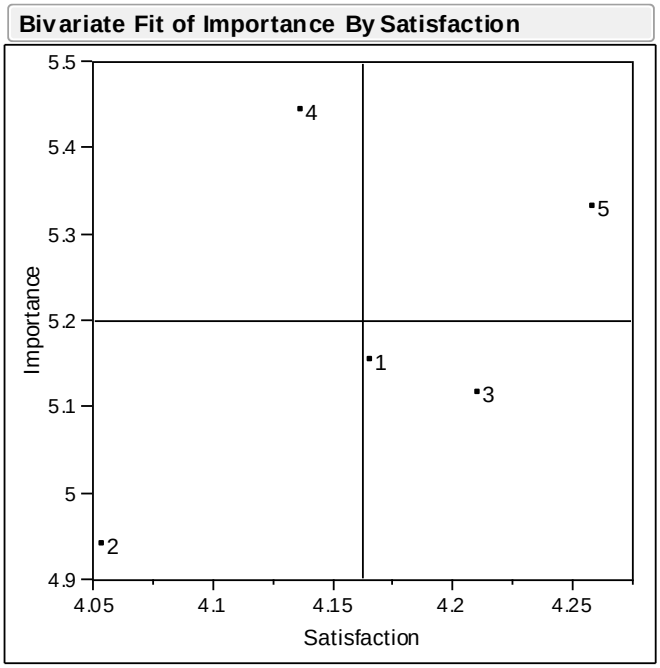
4 Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)

Quadran A of Importance-performance analysis of quality dimensions on the UNILA campus



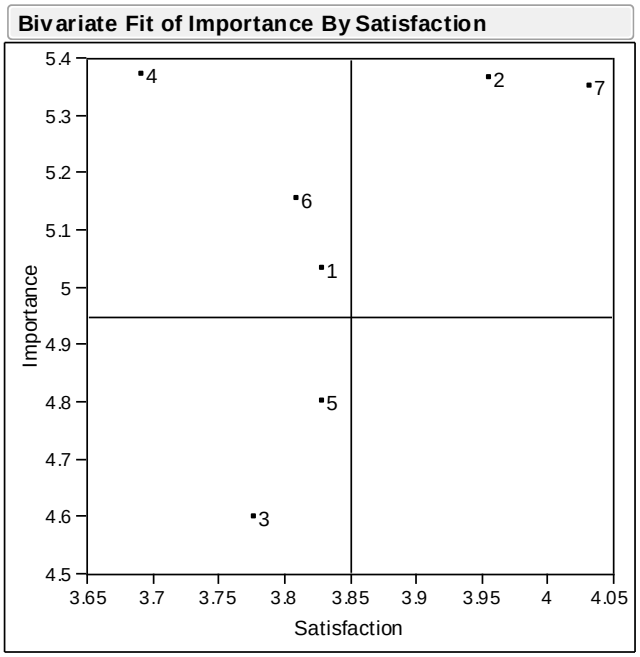
8 Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)

Quadran A of Importance-performance analysis of design dimensions on the UNILA campus



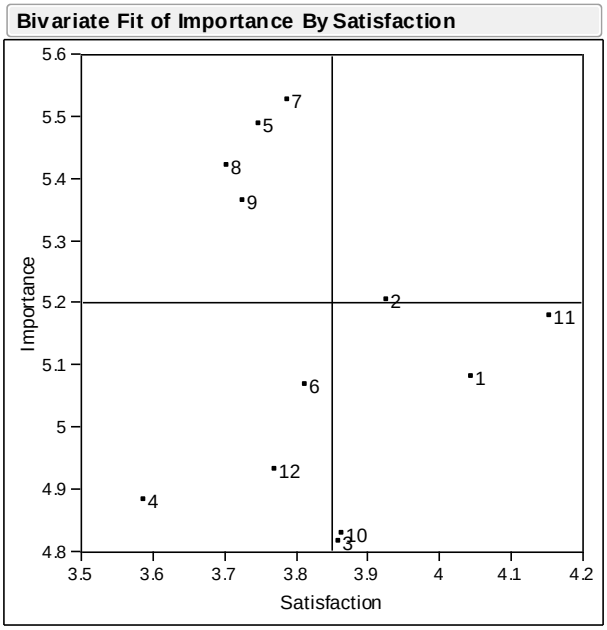
4 Safe from traffic accidents (crossing road)

Quadran A of Importance-performance analysis of safety dimensions on the UNILA campus



1 Convenience (protection) from weather conditions (e.g., heat, rain, wind);
4 Adequacy of light at night; 6 Air cleanliness (from dust, smoke, etc.)

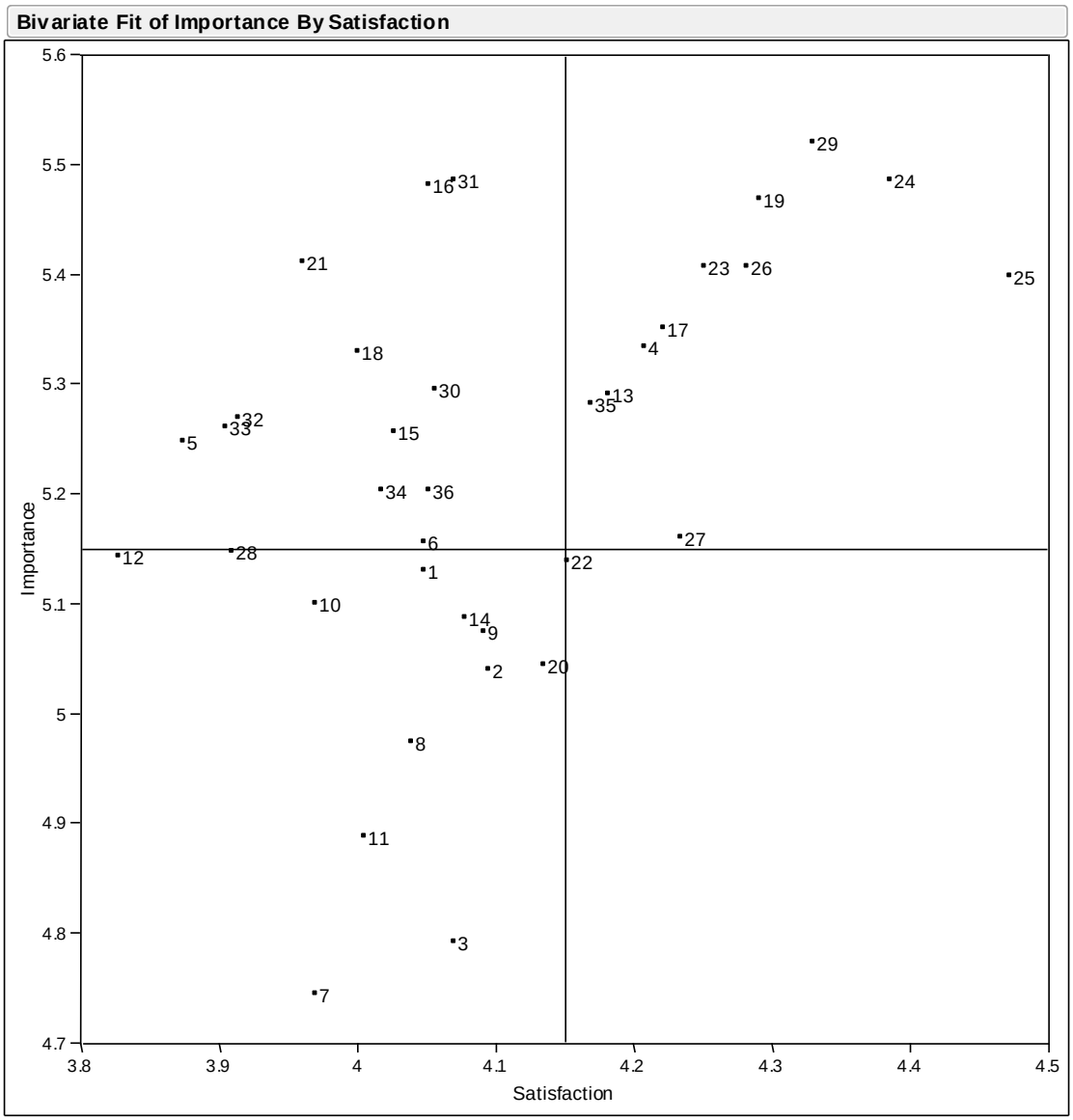
Quadran A of Importance-performance analysis of sensory dimensions on the UNILA campus



5 Availability of trash bins; 7 Availability of street lighting and sidewalks (lamp);
8 Availability of zebra crossing (street crossing/crosswalk);
9 Availability of median road to cross

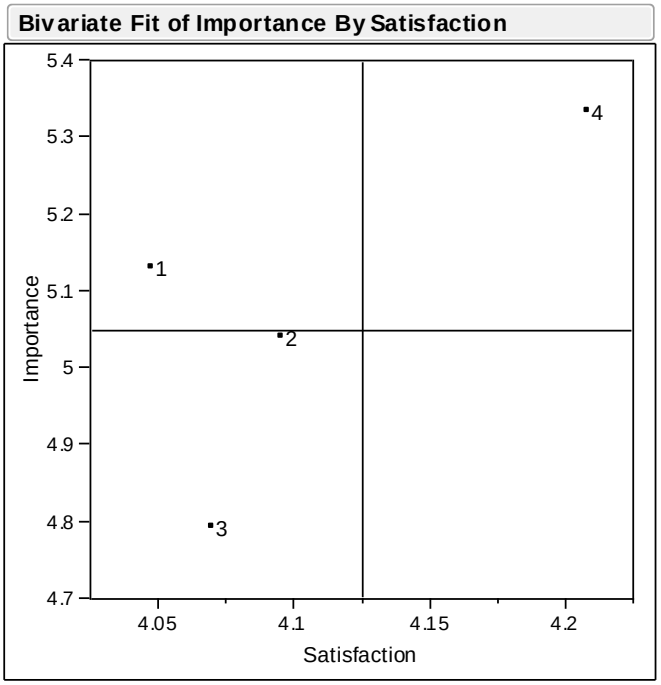
Quadran A of Importance-performance analysis of amenities dimensions on the UNILA campus

Appendix 3. Importance-Performance Analysis of UINRIL Campus



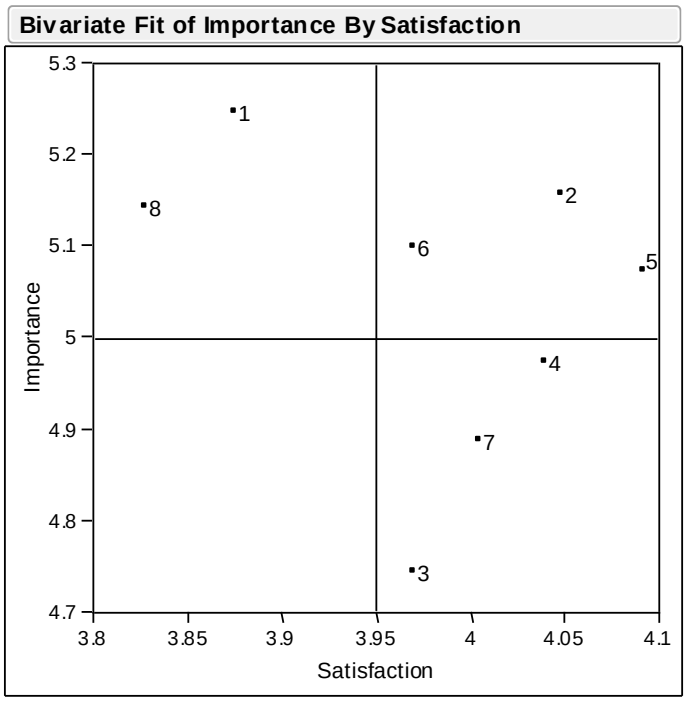
5 Width of path; 6 Type of material on the pedestrian path (grass, tiles, concrete, asphalt, etc.); 15 Safe from physical contact with bicycles; 15 Safe from physical contact with bicycles;16 Safe from traffic accidents (crossing road); 18 Convenience (protection) from weather conditions (e.g., heat, rain, wind); 21 Adequacy of light at night; 30 Availability of signage (traffic sign, map); 31 Availability of street lighting and sidewalks (lamp); 32 Availability of zebra crossing (street crossing/crosswalk); 33 Availability of median road to cross; 34 Availability of parking lots; 36 Availability of hydrants

Quadran A of Importance-performance analysis of the UINRIL campus



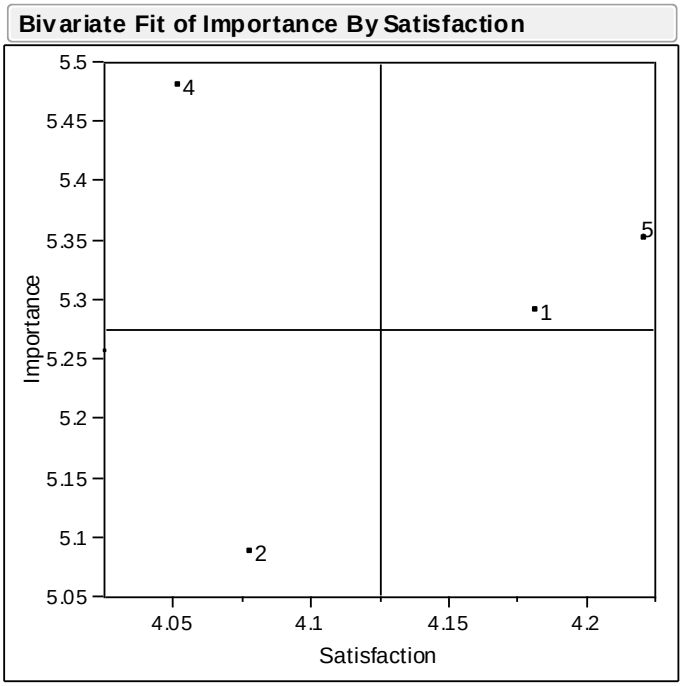
1 Durability of path material (strong, not easily broken)

Quadran A of Importance-performance analysis of quality dimensions on the UINRIL campus



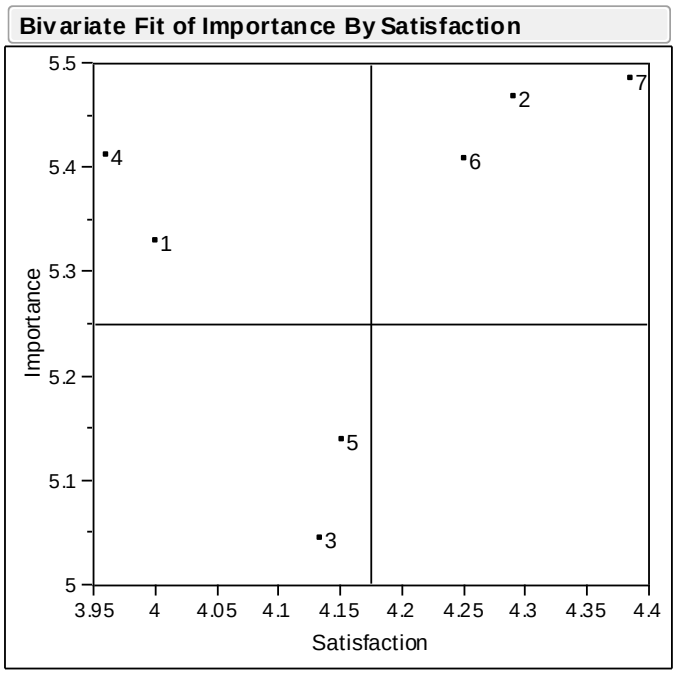
1 Width of path;
8 Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)

Quadran A of Importance-performance analysis of design dimension on the UINRIL campus



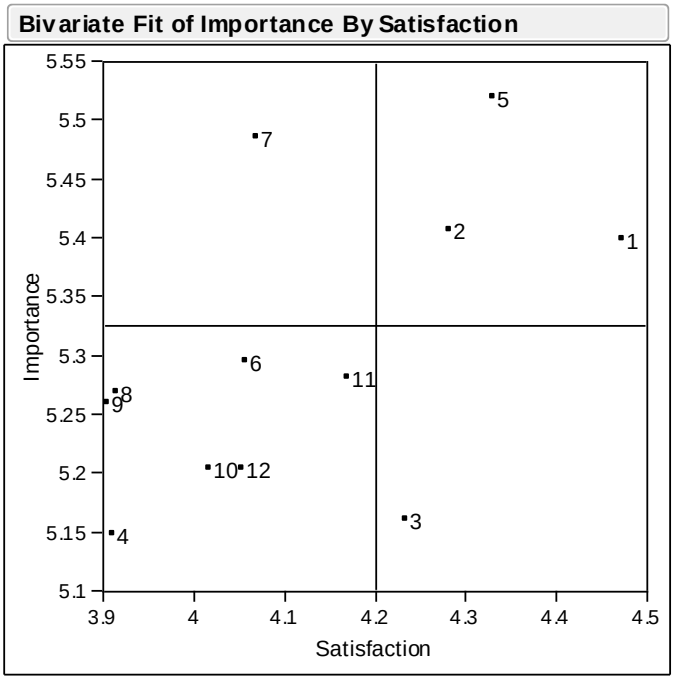
4 Safe from traffic accidents (crossing road)

Quadran A of Importance-performance analysis of safety dimensions on the UINRIL campus



1 Convenience (protection) from weather conditions (e.g., heat, rain, wind);
4 Adequacy of light at night

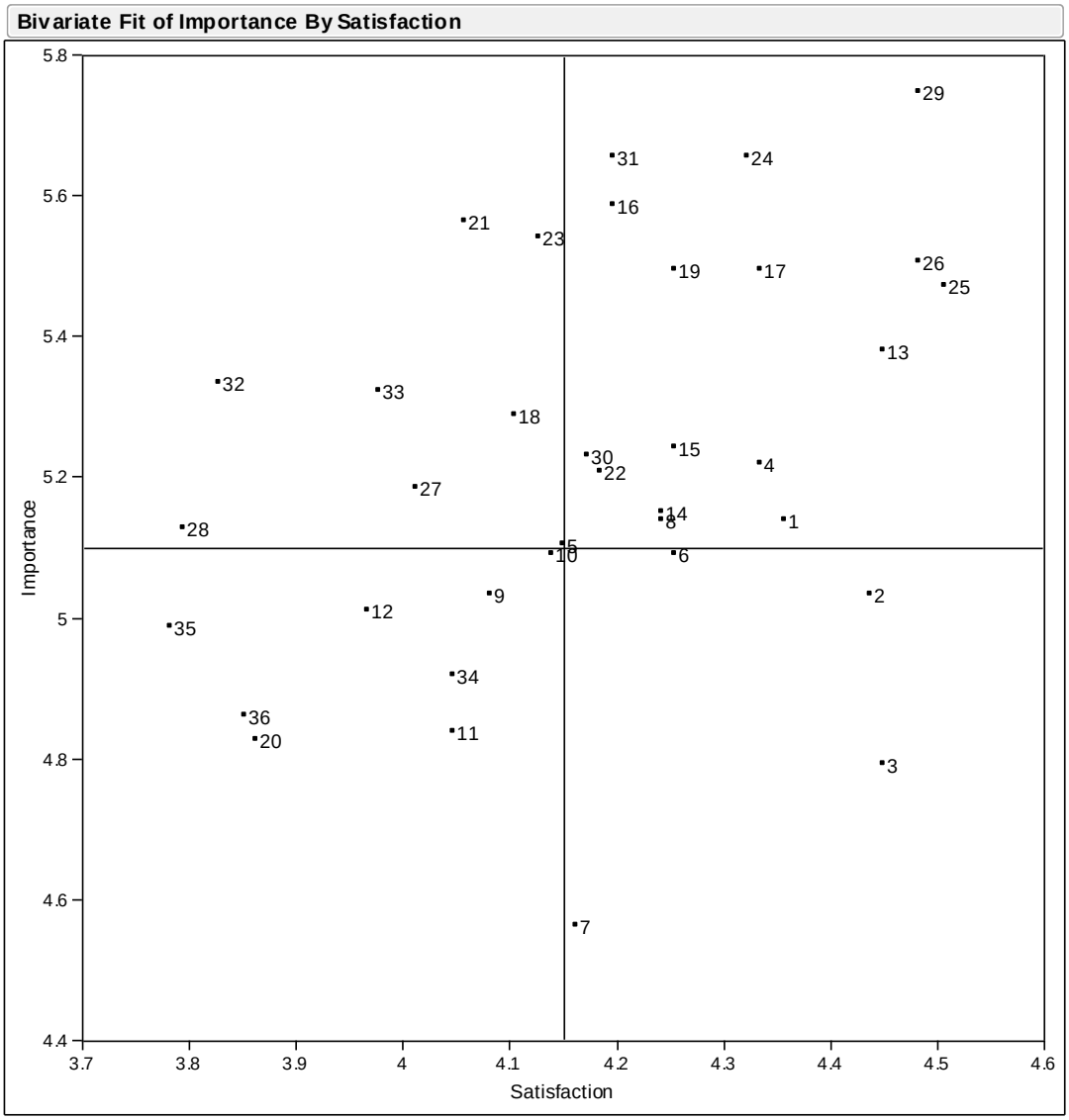
Quadran A of Importance-performance analysis of sensory dimensions on the UINRIL campus



7 Elevation of the sidewalk higher than the road surface

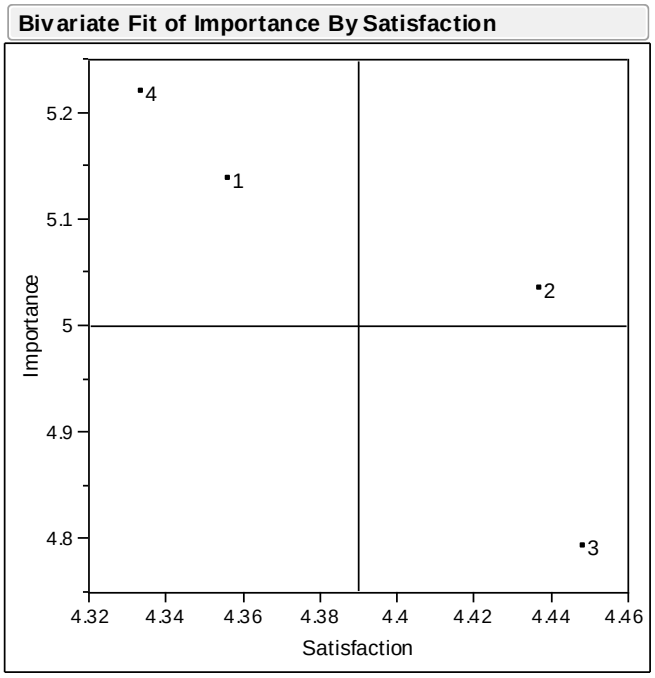
Quadran A of Importance-performance analysis of amenities dimension on the UINRIL campus

Appendix 4. Importance-Performance Analysis of the POLINELA Campus



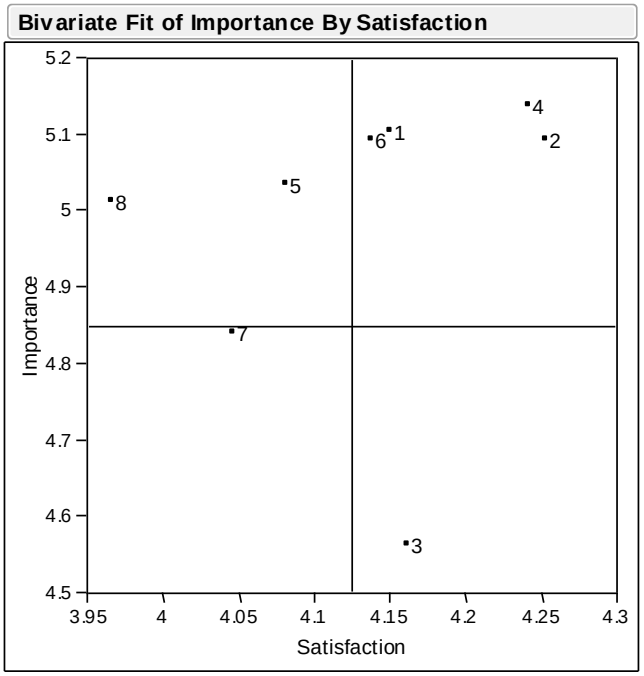
5 Width of path; 18 Convenience (protection) from weather conditions (e.g., heat, rain, wind); 21 Adequacy of light at night; 23 Air cleanliness (from dust, smoke, etc.); 27 Availability of shelter (gazebo);
28 Availability of benches (seats around the sidewalk); 32 Availability of zebra crossing (street crossing/crosswalk);
33 Availability of median road to cross

Quadran A of Importance-performance analysis of the POLINELA campus



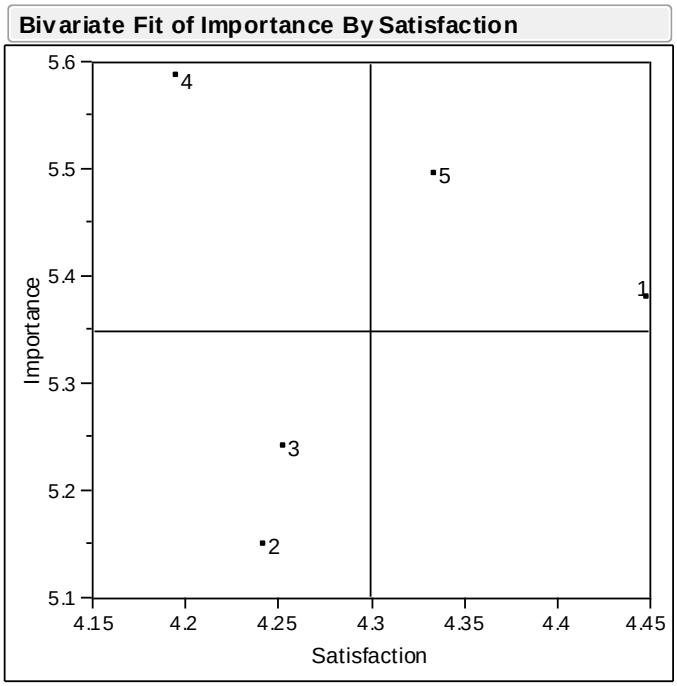
1 Durability of path material (strong, not easily broken);
4 Periodic maintenance (e.g., a smooth surface, bump, weeds, debris, trash, etc.)

Quadran A of Importance-performance analysis of quality dimensions on the POLINELA campus



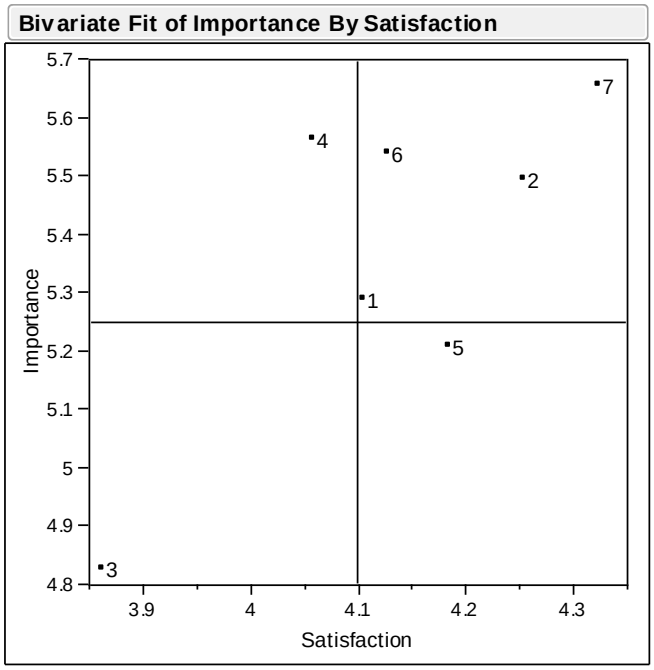
5 Connectivity with other paths and facilities (parking area, bus stop, etc.);
8 Completeness of supporting tools for disability (e.g., guiding block, ramp, etc.)

Quadran A of Importance-performance analysis of design dimensions on the POLINELA campus



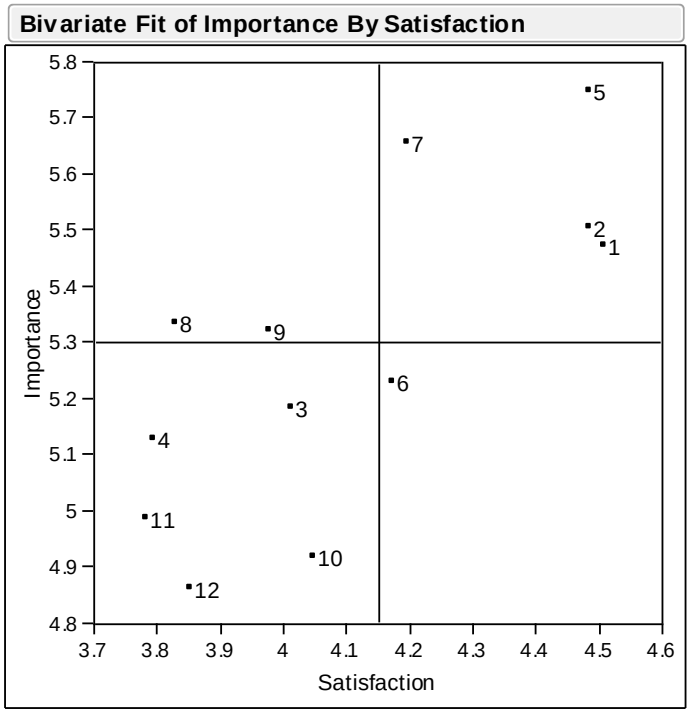
4 Safe from traffic accidents (crossing road)

Quadran A of Importance-performance analysis of safety dimensions on the POLINELA campus



4 Adequacy of light at night

Quadran A of Importance-performance analysis of sensory dimensions on the POLINELA campus



Availability of zebra crossing (street crossing/crosswalk); Availability of median road to cross

Quadran A of Importance-performance analysis of amenities dimensions on the POLINELA campus