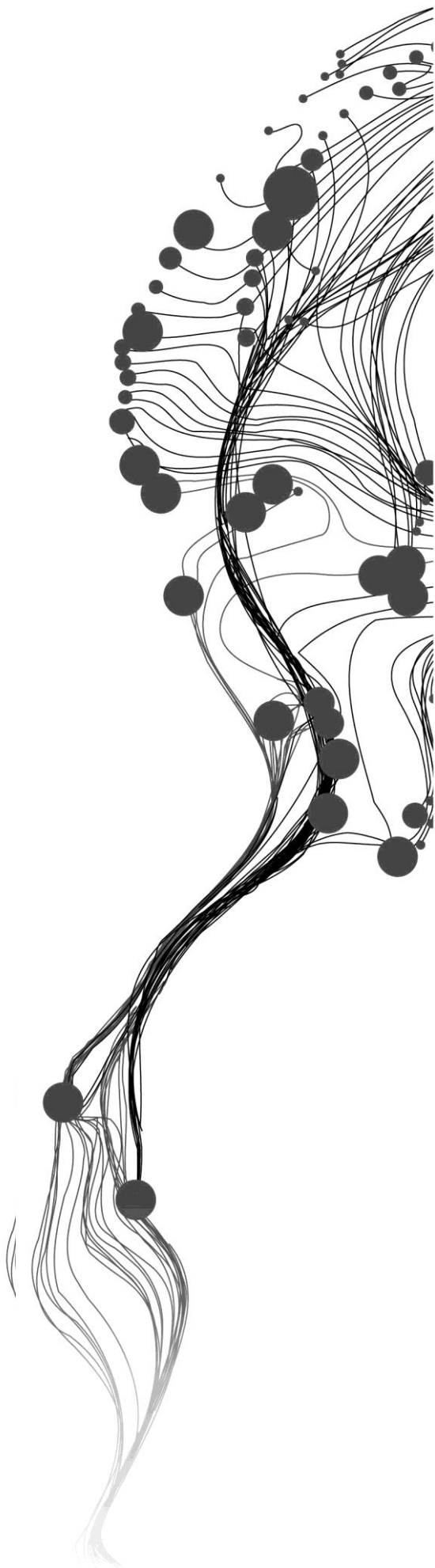


**Applying Transport Quality of Life
(TQoL) assessment as a public
transport appraisal technique.
Case Study: Yogyakarta, Indonesia.**

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February, 2012

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ABSTRACT

This thesis studies the Transport Quality of Life (TQoL) concept as developed by Andrew Carse for the appraisal of public transport in the context of a developing city.

To develop the TQoL concept, QoL techniques have been applied to two types of public transport in Yogyakarta city in Indonesia. Both bus systems have been analyzed on their TQoL in order to identify a best mode.

Two surveys were used to collect the data. A first survey intended to select TQoL indicators and their weightings in an expert group meeting using a survey monkey web survey. In a second survey people's perception based on their stated journey quality from pre-determined selected bus stop locations was conducted to evaluate TQoL.

The Spider diagram was used to quantify and present the TQoL scores for the two systems. T-tests were used to identify the significant differences in TQoL. Throughout the thesis using TQoL score, the two bus systems were assessed in various aspects to see accuracy of the TQoL appraisal tool that can identify differences in journey experience.

Applying TQoL as an appraisal technique for public transport assessment showed that in Yogyakarta, Transjogja is providing a considerably higher TQoL compared to the regular bus. By evaluating public transport from a passenger's viewpoint, the TQoL technique can help to validate existing techniques to make transport appraisal more co-ordinated and comprehensive. The thesis therefore concludes that the TQoL technique should be used in addition to supplement existing techniques to enable the policy makers and practitioners make a better informed judgement decisions on how to improve the quality of transport.

Keywords: QoL, TQoL, public transport, appraisal.

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ACRONYMS

BRT	Bus Rapi Transit
CBA	Cost Benefit Analysis
DIY	Daerah Istimewa Yogyakarta
DNRR	Depletion of non-renewable resources
IDR	Indonesian Rupiah
NATA	New Approach to Appraisal
QoL	Quality of Life
RP	Reveled Preference
SP	Stated Preference
TQoL	Transport quality of life
UGM	Universitas Gadjah Mada

1. INTRODUCTION

1.1. General Introduction

Transport appraisal deals with the assessment of transport systems such as supports effective decision making in transport sector. Appraisal techniques are dominated by cost-benefit analysis that in transport usually deal with travel time saving and safety (Holz-Rau & Scheiner, 2011) and fall short to fully evaluate individual experiences of people's perception on the transport system they use. In the United Kingdom the 'New Approach to Appraisal' (NATA) is proposed as the mechanism by which all new transport projects are assessed, and embodies the issues of sustainability (nottingham.ac.uk) in terms of criteria of economic, environmental and social impacts. Part of such new approach is thought to be the inclusion of people's perception in the appraisal. For this Transport Quality of Life concept has been introduced.

Transport Quality of Life is a specialization of the Quality of Life (QoL) concept and deals with how people evaluate the quality of life for their daily travel and can be used as an appraisal technique. QoL is mostly applied in the context of developed countries; so far only very few of QoL studies, which relate to transport, are conducted to cities in developing countries like in Asia or Africa. Lee(2008) for example studied QoL for Taipei, while Møller (2007) studied it for South Africa. Recently QoL was adopted for use in the transport planning sector. For instance, Steg & Gifford (2005) tried to find the relation between sustainable transportation and quality of life. Other authors tried to get better understanding of the impacts of mobility on the quality of life in the context of non-working trips by elderly in Canada (Spinney, Scott, & Newbold, 2009).

More specifically, QoL concept is dimensional in nature and very context dependent (Bramston, Pretty, & Chipuer, 2002; Shin, Rutkowski, & Park, 2003). Quality of Life relates strongly to people and therefore to the core of sustainable transport. Consequently, during designing and implementing sustainable transport plans QoL effects should be considered because they are crucial for the acceptability, consequently the feasibility and effectiveness of such plans. Sustainable transport plans will be strongly opposed against when users believe the plans will significantly reduce their QoL (Steg & Gifford, 2005).

As said, transport appraisal is dominated by some techniques like CBA (Cost Benefit Analysis), economic valuation, stated preference, stated choice methods, service quality index and so on (Holz-Rau & Scheiner, 2011; Wang, Borgers, Oppewal, & Timmermans, 2000). All these techniques have successfully been applied in the assessment of transport systems. But most of them are focusing on specific aspects of the system. For instance, travel time savings, safety issue(Holz-Rau & Scheiner, 2011), however travel time should not be the main factor for appraisal (Metz, 2008), as transport is more than that. Transport Quality of Life (TQoL) refers to the experience encountered by passengers travelling (by for example public transport)(Carse, 2011). Different factors together, for example: economic, social, environmental, personal factors all together explain people's journey quality in a holistic model. Thus, knowing the needs and demands of the people through quality of life studies would ensure that the planned transport system would match the sustainable quality criteria. Thus transport assessment through transport quality of life indicators can be used as a transport appraisal technique (Carse, 2011). Even more so, assessing transport systems in the context of a city in Indonesia, where people's perceptions are regarded crucial in any policy development and where many new transport initiatives (such as Bus Rapid Transits) are currently developed could benefit from a TQoL approach.

Transport Quality of Life is a specialization of the Quality of Life (QoL) concept and deals with how people evaluate the quality of life for their daily travel that can work as like the way of appraisal technique. QoL is mostly applied in the context of developed countries; so far only very few of QoL studies, which relate to transport, are conducted to cities in developing countries like in Asia or Africa. Lee(2008) for example studied QoL for Taipei, while Møller (2007) studied it for South Africa. Recently QoL was adopted for use in the transport planning sector. For instance, Steg & Gifford (2005) tried to find relation between sustainable transportation and quality of life. Other authors tried to get better understanding of the impacts of transport mobility on the quality of life in the context of non-working trips by elderly in Canada (Spinney, et al., 2009).

TQoL is a concept representing people's perception of the transport system. Based on the Quality of Life theory, it is multi dimensional in nature and very context dependent (Bramston, et al., 2002; Shin, et al., 2003). Quality of Life relates strongly to people and therefore to the core of sustainable transport. Consequently, during designing and implementing sustainable transport plans QoL effects should be considered because they are crucial for the acceptability, consequently the feasibility and effectiveness of such plans. Sustainable transport plans will be strongly opposed when users believe the plans will significantly reduce their QoL (Steg & Gifford, 2005).

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1.2. Justification of the Research

Passengers' opinions and views are seen as crucial in evaluation of the public transport system. Most of the transport appraisal techniques are based on travel time savings, safety (Holz-Rau & Scheiner, 2011; Metz, 2008). A gap is still remains to evaluate the journey quality from a passengers' view point. The TQoL concept can fill up the gap to get people's view on public transport system.

Bus Rapid Transit has emerged as an economically advantaged mass rapid transit system with significant potential in developed cities, even many cities of developing country recently introduced BRT system, and the city of Yogyakarta in Indonesia is one of them. Although the development of BRT is viewed by many as preferred solution for urban mobility problems, but the success cannot be taken for granted because of the many different aspects that need to be taken care of. One of the most important aspects is the appraisal of the system by all the socio-economic groups of the urban community relating to transport quality of life.

It is generally accepted that sustainable transport implies balancing current and future economic, social and environmental qualities (Steg & Gifford, 2005) and all these qualities are the determining factors of TQoL. Therefore, context sensitive application of TQoL can be applied to dominant public transport modes in the context of any city of any developing country. TQoL can also be an instrumental in stimulating modal shift from private transport like car/motorcycle to public transport.

The success rate of the system is not granted unless the evaluation aspect of the system by the users of the system is guaranteed. TQoL provides the details of journey quality experience considering factors like economic, social, environmental, and personal perceptions in a one holistic model. Finally, TQoL can be a supportive measure for any government like a developing country such as Indonesia to improve the current public transport system of Yogyakarta city according to people's perception.

1.3. Research Problem

Studies on applying transport appraisal technique in developing countries are limited compared to developed countries such as United Kingdom, Australia. Furthermore, there are limited appraisal studies that can show the bigger picture of people's experience to evaluate a transport system, so this study tries to fill this gap. For this research, Yogyakarta serves as a case Study.

In a community-centred society as Indonesia, passengers' opinions are central to decision makers rather than solely those of operators and planners. In the evaluation of Yogyakarta's public transport system, service quality is perceived as an important determinant of users' travel demand, following (Prioni & Hensher, 2000). Considering public transport, both operators and authorities need to understand how consumers/passengers evaluate the quality of the service offered. Understanding people perceptions about these facilities provides useful market information which can be employed to identify shortcomings in current facilities, to develop new facilities, to develop and justify planning strategies and/or evaluate usefulness in achieving agency objectives (Shafer, Lee, & Turner, 2000)

As the city of tourism, education, and culture, Yogyakarta, Indonesia, has been the destination for the other regions, not only in Indonesia but also in abroad. The inherent characteristics of the developing countries like population density brings impact on the heavier burden carried out in delivering the service for the people inside, including the service in terms of transportation. With a population density of 11,940 inhabitants/km² (30,927/sq mi) (2008) and within the metro is 1,588,622 ("Wikipedia," 2011), public transport is one of the most feasible solutions to Yogyakarta's transport problems.

The image of public transportation system in Yogyakarta is poor. A low attitude on safety, security and sometime rude behaviour of the operators generate public's negative perception upon the services delivered, both for public transport called TransJogja and regular (two common public bus system in the city). Usually passengers do not evaluate their journey based on only the cost of the journey or how safe the feel, a much wider range of issues need to be considered. Recent indication shows that poor service of public transportation system makes the public shift to personal vehicles. This rapid change has been seen to cause a lot of problems such as: bad air quality due to pollution, decrease in cities attraction, increasing traffic jams which eventually translate to economic stagnation.

The growing nature of any urban city has forced to rethink on the existing public transport modes within the city. TQoL can be applied in public transport because the purpose and evaluation used is well suited for the understanding of passengers' journey. Rather than measuring one or two components, it evaluates many different elements in one holistic model (Carse, 2011). If we try to develop the TQoL concept

accompanying set of indicators in the context of Yogyakarta, specially looking at exiting two bus systems, a further modal shift from motorcycle to public transport can be stimulated. As such, the output of the TQoL study can work as an illustrative tool for analyzing and communicating information to politicians and decision-makers to help them identify where to invest in future transport systems.

The government of Yogyakarta wants to improve public transport system to encourage people to choose public transport instead of private transport. To deal with these issues key understanding of people's perception about the system is necessary which can easily be derived using Transport Quality of Life. It is found from Focus Group discussion that public transportation reformation in Yogyakarta will only be succeed if it is supported by public participation (Pustral, 2006). So TQoL can be a good approach of participation in the decision-making to set policy associated with their interest. However, people do not necessarily have a position in the governmental institution but they must have access and be able to control the policy formulation process.

The existence of public transport, especially bus is really needed to support the mobilization of the people in Yogyakarta. TQoL is well suited for getting better understanding of passengers of the public transport system because there is no such appraisal technique available that assess the journey quality from passengers' view point. Most of the dominant transport appraisal techniques like Cost Benefit Analysis (CBA), economic valuation, stated preference, stated choice methods, service quality index put focus on specific aspects, mostly travel time saving and safety (Holz-Rau & Scheiner, 2011; Wang, et al., 2000). Many authors agree that travel time should not be the main aspect for appraisal (Metz, 2008), perception on availability, affordability, quality, comfort, accessibility etc. also contribute to appreciation of transport system.

Thus, a research on how to apply and adapt TQoL in Yogyakarta as an appraisal in needed to obtain such information depicting the perceptions of the people towards the public transport that makes it possible for decision makers to make informed and long term decisions thus contributing to the betterment of the public transport.

1.4. Research Objective

1.4.1. Main Objective

The main objective of the research is to define and operationalise TQL concept in the context of Yogyakarta, Indonesia. To achieve the main objective following specific objectives and research questions are formulated.

1.4.2. Sub Objective

- To review various appraisal techniques used to assess public transport.
- To apply and define the TQoL concept for Yogyakarta, Indonesia.
- To implement TQoL indicators to measure performance of the public transport system.
- To recommend on improving public transport system.
- Assessing the usefulness of TQoL as a technique of transport appraisal.

1.5. Research Question

The following research questions will be raised in order to answer the research objectives:

No	Specific Research Objectives	Research Questions
1.	To review various appraisal techniques used to assess public transport	<ul style="list-style-type: none"> • What are the present techniques being used for appraisal of public transport system?
2	To apply and define the TQoL concept for Yogyakarta, Indonesia	<ul style="list-style-type: none"> • How to use the TQoL concept building factors in the context of Yogyakarta? • What are the main indicators of measuring public transport quality of life?
3	To implement TQoL indicators to measure performance of the public transport system	<ul style="list-style-type: none"> • How can the proposed public transport system deal with the indicators that passengers' prefer? • Which indicators are getting a higher priority?
4	To recommend on improving public transport system	<ul style="list-style-type: none"> • Based on the TQoL assessment, which improvements in the public transport system of Yogyakarta can be proposed?
5	Assessing the usefulness of TQoL as a technique of transport appraisal.	<ul style="list-style-type: none"> • How does the TQoL concept perform as an appraisal technique for transport planning?

Table 1-1: Research Question

1.6. Conceptual Framework

The structure of the conceptual framework of applying TQoL as an appraisal technique in the context of an urban transport system in a developing city is mainly based on the TQoL concept of the study area. According to figure 1-1, transport quality of life concept defining factors as initially been derived by Carse(2011) which consist of economic, social, environmental, personal. After using these factors, indicators of different categories can be derived; we will be able to get an idea of people's perception on transport quality of life in the context of the study area. Finally this TQoL score can be used as an appraisal of the systems and fill the gap of including people's perception in the more standard appraisal techniques.

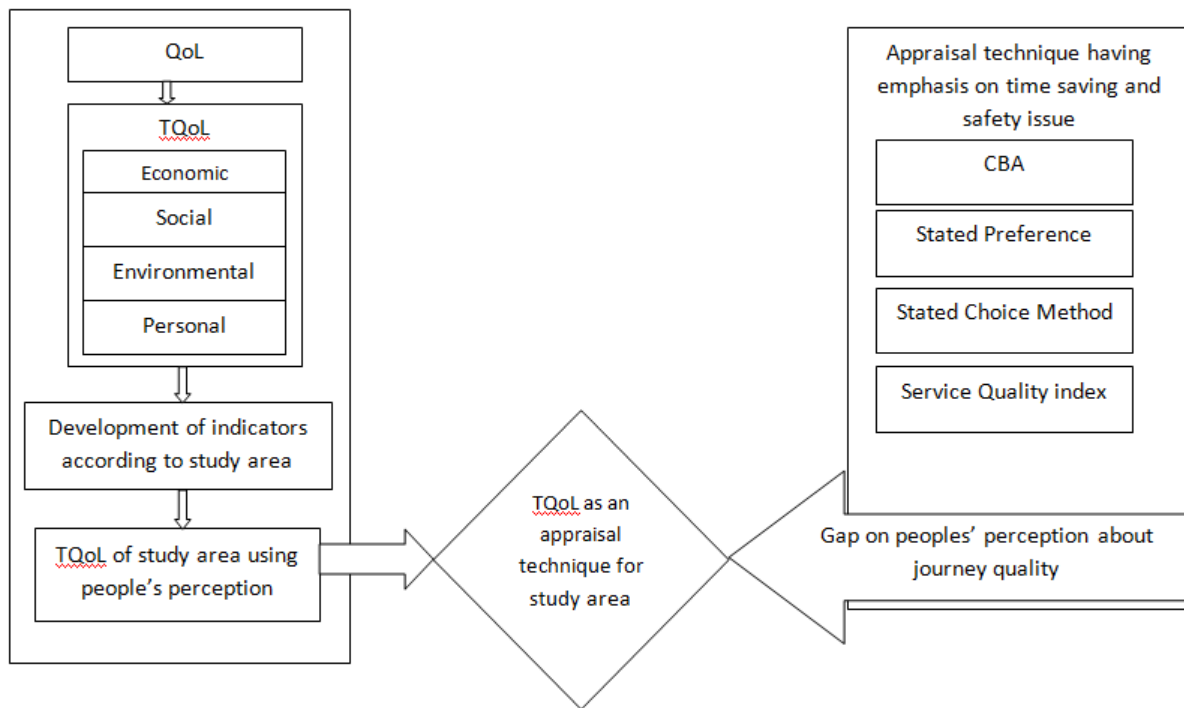


Figure 1-1: Conceptual Framework of TQoL of the study area

1.7. Structure of the Report

Chapter-1 Introduction

Briefly presents the general introduction and justification for the research, identifies the research problem, defines the research objectives and questions and provides a general overview of how the research aims to achieve the intended objectives.

Chapter-2 Literature Review

Based on literature survey, this chapter describes and defines the theoretical concepts of QoL, TQoL and also looks at how different appraisal technique works in transport planning.

Chapter-3 Study Area

Gives a general description of the study area based on topography, land use, road network, socio-economic characteristics, current situation of public transport both regular and TransJogja.

Chapter-4 Methodology

Presents the methodology and data collection techniques used in the research. It outlines and discusses the methods and data collection techniques used from Pre-field work stage to Post field work stage and shows the overall data analysis procedure followed.

Chapter-5 Analysis and Result

This chapter contains the detailed analysis of TQoL concept of two different public bus system of Yogyakarta.

Chapter-6 Discussion and Findings

Results from the TQoL appraisal and its policy implications, Value added of TQoL as compared to other appraisal techniques, comparison of the application of the TQoL concept as applied in this study with the application of another TQoL study.

Chapter-7 Conclusion and Recommendations

This chapter includes over view of the concept by highlighting the scope of the study and further improvement of this study.

2. LITERATURE REVIEW

This chapter review literature on the concept of Quality of life and methods to measure it. First the concept is identified then the relation between Quality of life in transport planning is reviewed. In the third section the current debates in transport appraisal are reviewed to demonstrate why there is a need for TQoL concept in transport research. The fourth section finally reviews some details about TQoL concept.

2.1. Concept on Quality of Life

Quality of life (QoL) is a multi dimensional concept and is context dependent (Bramston, et al., 2002; Shin, et al., 2003). QoL is a broad term which encompasses a notion of good life, a valued life, a satisfying life and a happy life (McCrea, Shyy, & Stimson, 2006). Researchers from a variety of disciplines have studied QOL from several disciplines (Marans, 2003). Depending on the objective, several authors define the concept differently. For example: Tuan Seik (2000) defines QoL as individuals overall satisfaction with life. Costanza et al. (2007) defines QoL as the extent to which objective human needs are fulfilled in relation to personal or grouped perception of subjective well being. Sometimes authors tried to identify the elements of QOL and compared various geographical areas such as cities, states and nations by means of QOL indices that they developed.

QoL has two dimensions which are known as subjective and objective QoL. The subjective QoL deals with individual perception or satisfaction with the condition of life they have (Bramston, et al., 2002). This aspect of QoL is measured using subjective indicators and is done mostly by collecting primary data. These data are collected applying different types of surveying methods, participatory approaches like focused group discussion. Most of the time this survey is carried out using structured questionnaire with Likert-scale with different ranges. In the other hand the objective quality of life deals with the external condition of life people have, these are measured using objective indicators. They are derived from secondary data like census, crime record, and public service quality and availability reports. Ultimately, adopting subjective indicators for measuring service quality allows considering only the customer requirements; on the contrary, considering also objective measures may be helpful in a way to meet not habitual users' needs or attract new users (Eboli & Mazzulla, 2011b). While people's perceptions on public transport in Yogyakarta, subjective indicators are the better choice for this research.

2.2. Why QoL in Transportation Planning?

Mobility is an essential part of human life. Therefore, it also plays an important role in Quality of Life. Hence there is a need to understand the relationship between QoL and sustainable transport better. Usually sustainable transportation planning raises a number of issues regarding the definition of sustainability versus sustainable transportation, i.e. how goals and objectives are defined and evaluated, and the type of decision-making process that should be used (Litman & Burwell, 2006). Sustainability requires more comprehensive and integrated planning, which accounts for a broad set of economic, social and environmental impacts as listed in table 2-1:

Economic	Social	Environmental
Traffic congestion	Inequity of impacts	Air and water pollution
Mobility barriers	Mobility disadvantaged	Habitat loss
Accident damages	Human health impacts	Hydrological impacts
Facility Costs	Community interaction	DNRR
Consumer Costs	Community livability	
DNRR	Aesthetics	

DNRR: Depletion of non-renewable resources

Table 2-1: Transportation impacts of sustainability (source: (Litman & Burwell, 2006))

There are many ways to improve transport systems, such as introduction of new transport policies, direct intervention (e.g. road-user charging), and infrastructure investments. Transport appraisal provides the means to assess potential effects of these interventions and thus can help to improve systems. While most appraisal methods can be applied to assess public transport use, QoL research can typically handle a wide range of factors affecting societal differences in its appraisal. It evaluates many different elements in one holistic model rather than evaluating one or two components. A number of factors related to sustainability issues like economic, social and environmental etc. combine together to explain QoL. Thus, QoL concept is required to be applied in transport planning.

2.3. The Role of Transport Appraisal

Appraisal is a controversial issue in decision making due to disagreement on the role which should play in decision-making (Mackie, 2008). In an appraisal context, three broad set of influences on whether the project goes ahead are relevant: i) What the public thinks ii) What the economic appraisal says iii) The political context (Pearman, Mackie, & Nellthorp, 2003) . Figure 2-1 shows the influences on decision making.

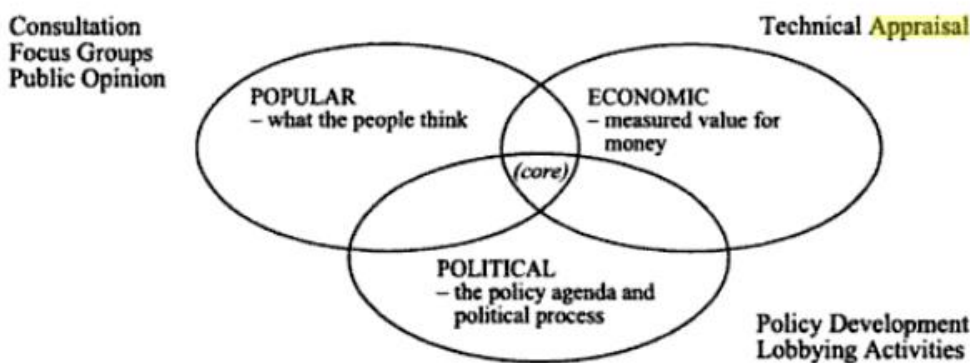


Figure 2-1: Influences on Decision-Making, the three spheres of appraisal (Source: (Pearman, et al., 2003))

The construction of the diagram assumes that there is a balance of forces which can be resolved within an over lapping core. For example both UK and the Netherlands have found that road user charging may pass the engineering economic test but not be acceptable socially or politically. Even in some countries, the balance of forces may be different. For example: external funding may be required in which case the goals, criteria and assessment of the external funding agency come into the picture (Mackie, 2008).

A slightly different way of conceptualizing transport appraisal is in a hierarchical way is shown in figure 2-2:

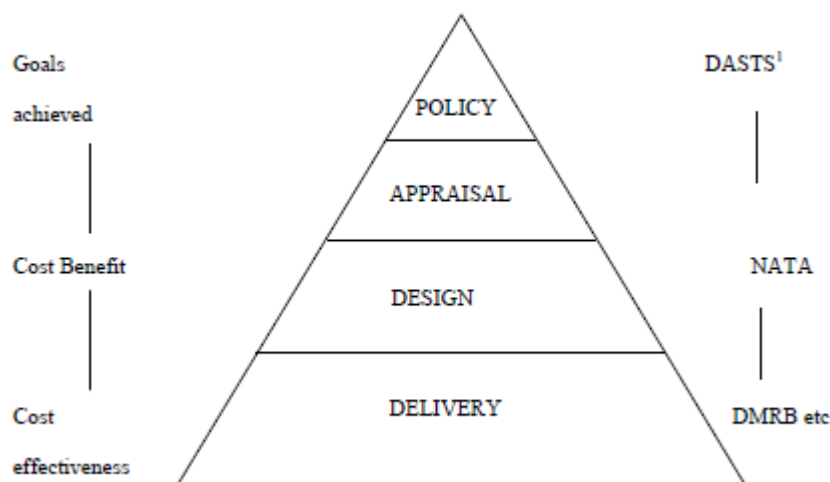


Figure 2-2: Transport Hierarchy (Source: (Mackie, 2008))

In the European Union, appraisal is generally used to assist the process of planning transport systems. It provides relevant information to decision-makers, but it does not actually ‘make’ decisions (Bristow & Nellthorp, 2000). The appraisal of changes in the transport network is one of the most important applications of transport economics. There are several appraisal techniques being used in transport planning. Most of the dominated techniques are Cost Benefit Analysis (CBA), economic valuation, stated preference, stated choice methods, service quality index and so on (Feo, Espino, & García, 2011; Holz-Rau & Scheiner, 2011; Wang, et al., 2000).

The New Approach to Appraisal (NATA) is a framework used to appraise transport projects and proposal in the United Kingdom ("New Approach to Appraisal," 2011). NATA, introduced in 1998, is a form of cost-benefit analysis used to assess a proposed transport scheme’s value for money, deliverability and strategic fit. It is proposed to promote schemes that align with government objectives to improve safety, support economic activity, protect the built and natural environment and improve access to everyday facilities for people without a car. However, critiques say NATA ends up making transport projects that are bad for society look good because of the four major failings: i) it includes fuel duty revenue, ii) puts a monetary value on some things that can’t be monetized, iii) greatly exaggerates the time savings a new project would bring and iv) values some people less than others. (*Getting transport right, Proposal for better decision-making* 2008). As such badly formulated transport project may get green signal from the government because of the way of assessment processes is designed. So, the government should change its assessment processes so that we can end up with transport projects that benefit society and achieve the government’s own objectives.

Transport appraisal consists of different techniques. Usually EU countries have a tradition of using Cost benefit analysis (CBA) for the appraisal of public sector transport infrastructure projects. CBA is usually a fundamental piece of information for decision-makers, as it places a value on the net benefits of schemes and generates a ratio of benefits to costs which may be used to prioritise projects when funding is constrained ("Transport economics,"). From the guidelines of appraisal that are presented in the UK Treasury’s *Green Book*, it is found that cost-benefit analysis (CBA) is method which quantifies in monetary terms as many of the costs and benefits of a proposal that are feasible, including items for which the market does not provide a satisfactory measure of economic value (HM TREASURY, 2003).

According to Browne and Ryne (2011), CBA is currently used in a variety of situations, including:

- (i) to assess the costs and benefits of transport infrastructure options such as roads and public transport;
- (ii) to estimate congestion and travel time impacts of transport projects;
- (iii) to compare different technology choices;
- (iv) to assess the costs and benefits in scenario analysis; and
- (v) to evaluate overall transport policy and programmed options such as modal shift.

However, when dealing with impacts where no market values are available, such as time and accident costs, values diverge. The valuation of time becomes the primary difficulty in project appraisal.

Revealed preference (RP) and stated preference (SP) are two methods principally used in transport research. RP techniques infer an implicit price indirectly in examining consumers' behaviour in a similar or related market. Stated preference (SP) methods are widely used in travel behaviour research and practice to identify behavioural responses to choice situations which are not revealed in the market, and where the attribute levels offered by existing choices are modified to such an extent that the reliability of revealed preference models as predictors of response is brought into question (Hensher, 1994). SP are normally obtained by specially constructed questionnaires and interviews designed to elicit estimates of the willingness to pay (WTP) for, or willingness to accept (WTA), a particular outcome (HM TREASURY, 2003). In 1988, Kroes and Sheldon (1988) highlighted the following limitations of RP research to strengthen the case of SP in a seminar paper:

I. It can be difficult to obtain sufficient variation in the revealed preference data to examine all variables of interest

II. There are often strong correlations between explanatory variables of interest (particularly travel time and cost). These make it difficult to estimate model parameters reflecting the proper trade-off ratios.

III. Revealed preference methods cannot be used in a direct way to evaluate demand under conditions that do not yet exist.

IV. Revealed preference methods require that the explanatory variables can be expressed in "objective" or "engineering" units; therefore there are normally restricted to primary service variable (such as journey time and cost) and can in practice rarely be used to evaluate the impact of changes in secondary travel variables (such as seat design and station facilities).

Next to stated preference (SP), there is strongly related stated choice (SC) technique, the main difference is the method being used in assessment. Stated preference asks respondents to indicate their preference to a set of combinations of attributes toward a particular transport service on a rating scale. Stated choice asks respondents to choose one of a combination of attributes of a transport service. SP data refer to the stated responses of the respondents about hypothetical choices, which are designed by the researchers to reflect conditions that are not currently observable. The biggest strength of the SP methodology is its flexibility, e.g. a wide range of airport Level of Service (LOS) attributes can be reflected on for strategic planning purposes (Becky P.Y, 2008). In contrast, the main problem with state preference data is that stated behaviour is hypothetical: researchers cannot be certain that, should a given situation arise, decision makers will behave exactly as they said they would in the stated preference exercise (Feo, et al., 2011). Stated preference and stated choice modes are used frequently in research because they use statistical techniques to infer the potential travel behaviour of a new transport project.

The literature in the previous sections shows that there is no simple solution to the comprehensive evaluation of transport policy measures. Each of the tools examined here has different advantages and disadvantages and can be used to appraise different policy types and levels to answer different questions for policy maker. However, according to Browne & Ryne (2011) *“we do not consider that there is one optimal appraisal tool that can be used exclusively and suggest that a pluralist toolkit approach be used in impact assessment or sustainability appraisal in order to (i) validate and corroborate assumptions made in each of the approaches and (ii) capture commonalities, synergies and divergence”*.

All the above discussed techniques are successful in assessment of public transport. But most of them are focusing on specific aspects. For instance, Stated preference mainly focus on valuing travel time savings, on the other hand CBA puts more emphasis on Travel time saving and safety issue (Feo, et al., 2011; Holz-Rau & Scheiner, 2011), however travel time should not be the main factor for appraisal (Metz, 2008). Travel time savings are often cited as a key benefit of transport projects, but people in different occupations, carrying out different activities and in different social classes' value time differently. Appraising projects on the basis of their supposed reductions in travel times has come under scrutiny in recent years with the recognition that improvements in capacity generate trips that would not have been made, partially eroding the benefits of reduced travel times because sustainable transport planning needs more than that. Most of these current methods do not incorporate passenger experience into the evaluation of current and future transport systems. So it is needed to incorporate perceptions, opinions and experiences of passengers in an alternative transport appraisal technique so that planners, operators and governmental officials understand how different modes of transport perform.

2.4. Transport Quality of Life

Transport quality of life is defined as the experience encountered by passengers when they travel by public transport (Carse, 2011). The initiative for setting up of Carse's TQoL model was influenced by the discussion at the ninth World Conference on Transport Research (WCTR), 2001 where a special panel session was held to address the question of increasing the relevance and utility of transportation research. It was organized as a tribute to the late Professor Manheim, whose research career was based on developing analytical tools to support and enhance managerial decision-making (Ben-Akiva & Bonsall, 2004). After debating the idea how researchers can have more impact on public policy, the planning process, the transport product and, perhaps, the behaviour of individual travellers and shippers, the four recommended ways for new research were listed:

- i) Relevance: It should be make sure that formulation of the research problem should be based on an understanding of the present and future needs of decision-makers.
- ii) Interface: To increase interface through involving practitioners in the research process.
- iii) Credibility: The research should produce models that should be transparent and attractive for decision maker.
- iv) Dissemination: To make sure that research results need to be communicated to practitioners in non-technical language the results are communicated to practitioners in non-technical language (Ben-Akiva & Bonsall, 2004)

When relating to public transport people's perception play a very important role. Stardling, Carreno, Rye, & Noble (2007) for example found eight important underlying factors for not using public transport: i) feeling unsafe (e.g. 'Drunk people put me off travelling by bus at night'); ii) preference for walking or cycling (e.g. 'I prefer to walk'); iii) problem with service vision (e.g. 'No direct route'); iv) unwanted arousal (e.g. 'The buses are too crowded'); v) preference for car use (e.g., 'I feel more in control when I drive'); vi)

cost, vii) disability and discomfort, viii) self-image; all eight clearly perception induced, rather than objectively measured. To deal with these issues, TQoL concept is needed, and is introduced here.

Some authors already used user perception measurement to evaluate the effectiveness of transport system in terms of quality of life. Shafer, Lee, & Turner (2000) used people's perception related to Quality of life. They examined if and how people who used trails for different purposes differed in their perceptions of a trail's contribution to quality of life. Eboli & Mazzulla (2011a) used a passengers' point of view as a fundamental factor for evaluating transit service quality because they are the real customers of the services and for this reason they can be considered the most suitable judges of the services.

Despite the absence of a single definition of quality of life, many similarities and correlations among the concepts are applied by scientists for measuring this concept. A number of factors combine together to explain QoL. In Carse's (2011) TQoL conceptual model four factors: economic, social, environmental, personal explained the concept having a set of indicators because quality, impacts and differences between planning options can be assessed with the help of indicators. The initial indicator sets within the four factors are as follows:

TQoL			
Economic	Social	Environmental	Personal
<ul style="list-style-type: none"> • Employment • Vehicle travel • Congestion • Travel costs • Private transport infrastructure • Public transport infrastructure • Sustainable transport infrastructure 	<ul style="list-style-type: none"> • Safety • Transport diversity • Sustainable transport • Personal cost • Disabilities 	<ul style="list-style-type: none"> • Global air pollution • Local air pollution • Noise pollution • Green space 	<ul style="list-style-type: none"> • Quality • Access • Availability • Affordability • PT information • Congestion • Modal Change

Table 2-2: Initial indicator set used to develop TQoL (source: Carse, 2011)

However, developing indicators such as these requires considerable amount of data. Indicators need to be socially constructed as discussed by Astleithner & Hamedinger (2003). Thus, more efforts are required in collecting data related to indicators and defining all factors attributes that determine TQoL. For example users of the public transport system under investigation should be directly involved in the questionnaire from the starting phase to complete the survey.

The TQoL model was designed by Carse to help policy makers and transport operators understand more clearly how public transport is affecting passengers. Rather than a substitute for CBA or SP techniques, it is an alternative method to compare modes of transport (Carse, 2011). Even the tool was tested for and the results were very promising to the idea in this research.

3. STUDY AREA DESCRIPTION AND PUBLIC TRANSPORT SYSTEM

This chapter gives a brief description of the study area and the planning process for public transport. The description includes the geographic location, administrative boundaries, social-demographic condition and other characteristics of the city.

3.1. Background

Yogyakarta is city in the Yogyakarta Special Region (DIY), Indonesia. The city is often also called Jogja, Yogy. It is located in the middle of Java Island. Yogyakarta was the capital city of Indonesia from 1945 to 1949 during the Indonesian National Revolution("About Jogja,"). It is renowned as centre for classical Javanese fine art and culture such as batik, ballet, drama, music, poetry and puppet shows. Yogyakarta is the second most important tourist destination in Indonesia after Bali. The centre of Yogyakarta is the Kraton, or Sultan’s palace. It is an important centre for transport, business and cultural activities. Population density and economic activities are the main criterias in defining Yogyakarta as an urban city.

3.2. Location

The area of Yogyakarta city is 32.5 km². It is just 1% total square of DIY province. The city is located between 110°24’19"-110°28’53" east longitude and between 07°49’26"-07°15’24" south latitude, with 1.02% of the area of Daerah Istimewa Yogyakarta Province. The range between north and south is approximately 7.5 km and between west and east approximately 5.6 km.

Topographically, the city of Yogyakarta City is located in the southern plane of Merapi Mount’s Valley having an inclination of between 0-2%. The land is on the average of 114 meters from sea surface. A number of 1,657 hectares lies on the height of less than 100 m and the rest (1,593 hectares) is located on 100-199 m height from sea surface. Meanwhile, geologically, the city is mostly founded on the fluvio volcanic mountain of Merapi.

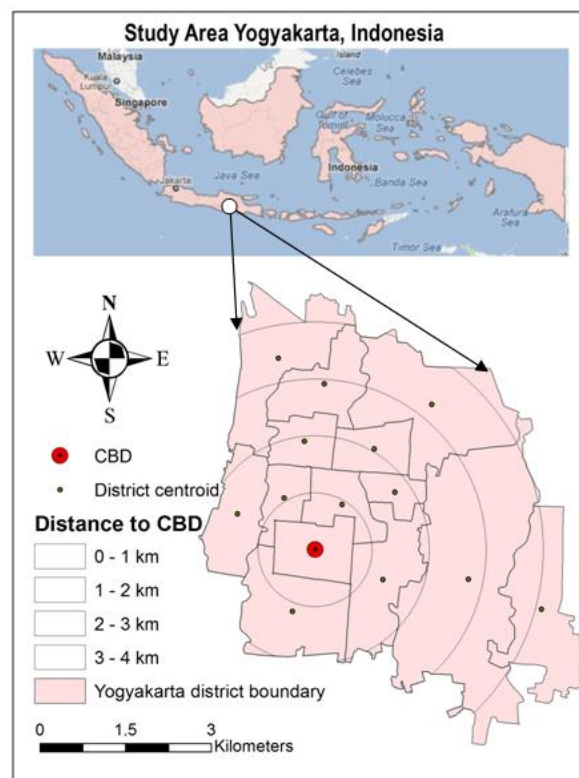
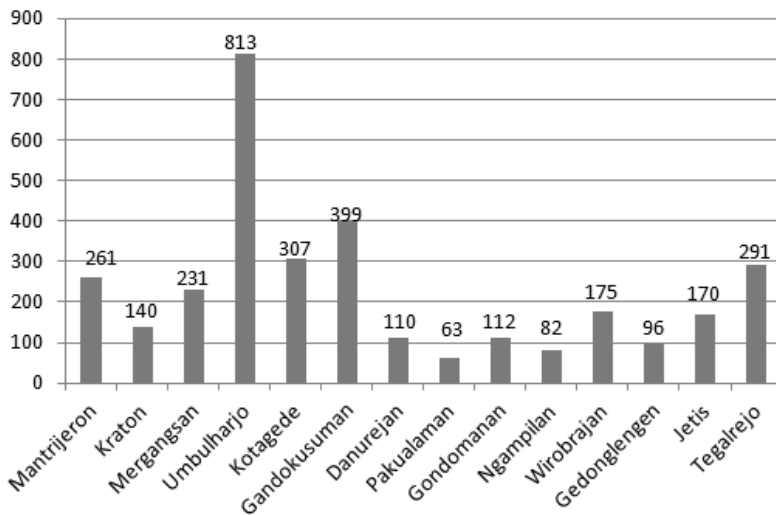


Figure 3-1: Study Area Location

There are 3 rivers flowing from north to south, those of: Gajahwong River flowing through the east of the City, Code River through the middle and Winongo River through the west part.

3.3. Administrative Boudaries

Yogyakarta city is consists of administratively 14 districts and 45 sub districts, 362 surrounding groups and 2,523 neighbourhood groups. The city is bounded with: North: Sleman Regency, East: Bantul and Sleman Regency, South : Bantul Regency, West : Bantul and Sleman Regency.



Based on figure 3-2 Umbulharjo has the higher area of 891 hectare and Pakualaman has the small area 63 hectares in size. Distribution of land area of all the districts and sub districts level of Yogyakarta are given in appendix A .

Figure 3-2: Distribution of total land area in hectare among different districts of Yogyakarta from year 2008

3.4. Land use

In 2008, most of Yogyakarta area was used for housing, that of 2,106.3 hectares and while the smallest area was fallow land, that of 20.041 hectare. Among the area of 32.50 km², 20.95 km² (64.5%) is used as community housing, 1.77 km² (5.5%) found as open space or agricultural land, while the rest is used as business, industry, etc (Kamulyan). So that means more than 90% of the area of Yogyakarta city is used for community housing and urban activities.

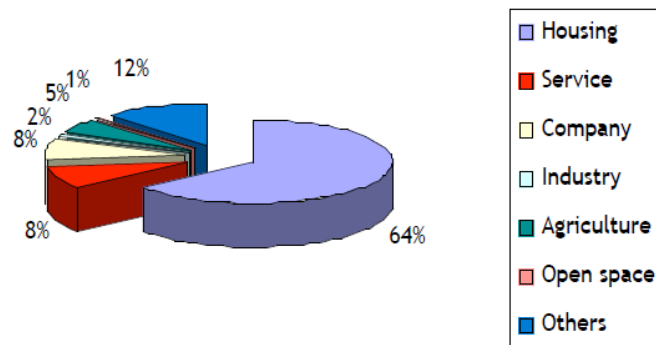


Figure 3-3: Land use distribution of the city of Yogyakarta
Source: Land use of Yogyakarta (Kamulyan)

3.5. Population

Demographic characteristics describe the population structure of Yogyakarta City based on age, gender, level of education and economic conditions. This also explains about population growth and population density in Yogyakarta city.

Based on a projection of 2000 population census, the total population of Yogyakarta City in 2008 was 456,915 lives, 48.86 percent was male and 51.14 percent was female. Generally, the number of female population was higher than the male population as the sex ratio less than 100. Sex ratio is the ratio of males to females in a given population and year, usually expressed as the number of males for each 100 females. The population distributions of 14 districts of Yogyakarta from the year of 2000 to year 2007 are projected as follows.

No.	District	2000	2001	2002	2003	2004	2005	2006	2007
1	Mantrijeron	38,736	39,242	39,693	32,730	32,659	35,718	36,364	41,450
2	Kraton	31,763	32,072	32,184	19,168	19,857	21,700	22,093	29,492
3	Mergangsan	41,155	41,700	42,193	30,093	31,488	34,426	35,049	42,954
4	Umbulharjo	65,252	66,912	69,239	71,375	69,479	75,996	77,371	75,989
5	Kotagede	27,733	28,408	28,980	29,358	27,979	30,608	31,162	33,018
6	Gondokusuman	72,233	72,811	73,730	47,195	48,617	53,160	54,122	76,302
7	Danurejan	30,431	30,642	30,840	18,517	19,822	21,673	22,064	32,884
8	Pakualaman	14,608	14,790	14,762	97,36	10,628	11,621	11,831	14,923
9	Gondomanan	20,130	20,532	20,625	14,266	13,935	15,222	15,498	17,873
10	Ngampilan	22,989	23,052	23,189	17,558	17,627	19,262	19,611	23,758
11	Wirobrajan	29,778	30,139	30,533	26,329	26,693	29,217	29,746	32,343
12	Gedongtengen	25,915	26,448	26,398	17,330	17,926	19,592	19,947	26,876
13	Jetis	37,552	37,959	38,268	23,736	26,038	28,480	28,995	38,531
14	Tegalrejo	38,350	39,128	39,726	34,848	35,256	38,561	39,258	42,396

Table 3-1: Population of Yogyakarta of different years (source: Kota Yogyakarta Dalam Angka Tahun 2009)

3.6. Population Density

According to data of year 2008, the city of Yogyakarta has a population density of about 14,059 pers / km². However, the population density is not evenly distributed across the districts. Ngampilah district has the highest population density of about 24,673 persons/ km² and Umbulharjo has the least population density of about 9768 persons/ km².

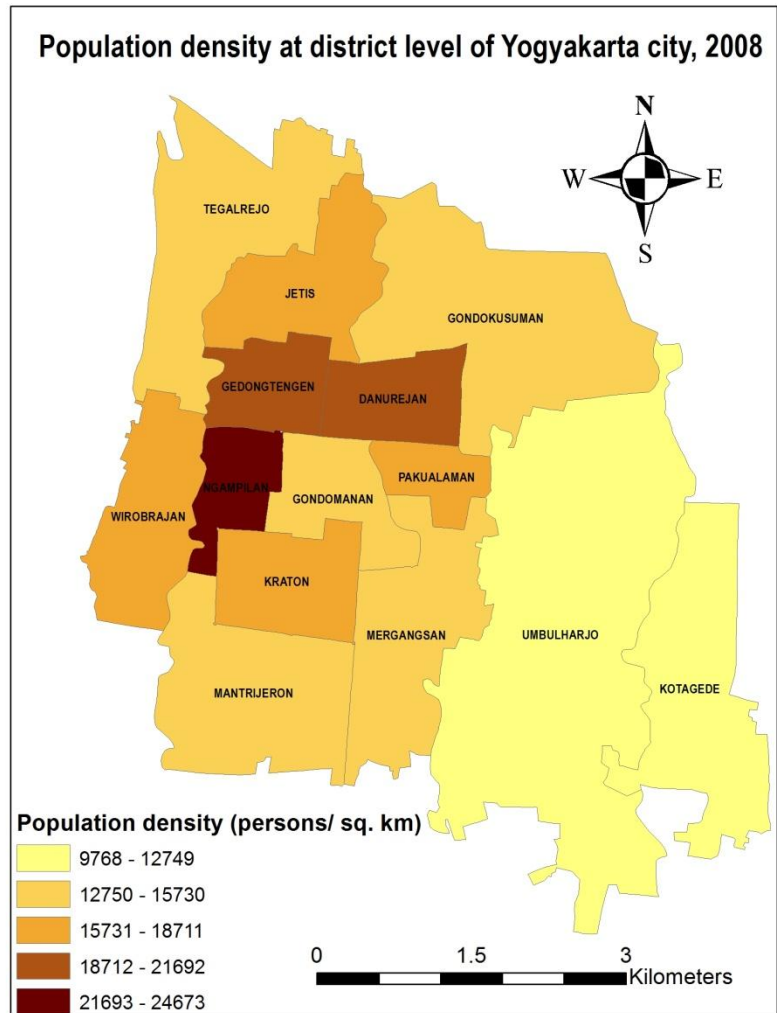


Figure 3-4: Population density at district level of Yogyakarta, 2008

3.7. Economic Activities

The main economic activities in Yogyakarta City are trading, services and transportation and communications, as the city is a major tourism centre. The economic structure is boosted by public service sectors like educational institutes and tourism. Agriculture, trade and industry have also some contribution in economic development. Tourism sector has the major contribution to the GDP.

3.8. Current Situation of Public Transport in Yogyakarta

Public transport system in Yogyakarta is generally not satisfactory to the mass people in terms of unsafe, lacking of professionalism, efficiency, quality, safety etc. Two kinds of public bus system exist in Yogyakarta: regular and patas. Patas buses are known as TransJogja. TransJogja is a Bus Rapid Transit (BRT) like system that is proclaimed by the Indonesian Department of Transportation. This system started operation in March 2008 and is still being expanded. Currently the city government is

contemplating the options for extending the system. The characteristics of the two public bus systems follow table 3-2.

Regular	TransJogja
<ul style="list-style-type: none"> • Runs in 19 routes. Some lines are not in operation like line 1, line 8, and line 13. 	<ul style="list-style-type: none"> • Runs in 8 routes. But two routes 4A and 4B are not in operation now.
<ul style="list-style-type: none"> • Operates for 24 hours 	<ul style="list-style-type: none"> • Operating hours from 6 am to 10 pm
<ul style="list-style-type: none"> • It stops any where according to the bus operator 	<ul style="list-style-type: none"> • It stops only designated bus shelter
<ul style="list-style-type: none"> • Travel time is shorter than transJogja 	<ul style="list-style-type: none"> • Some time travel time is longer

Table 3-2: Characteristics of two existing bus system in Yogyakarta

Some important routes of regular bus and routes of Transjogja are shown in figure 3.5 and 3.6.

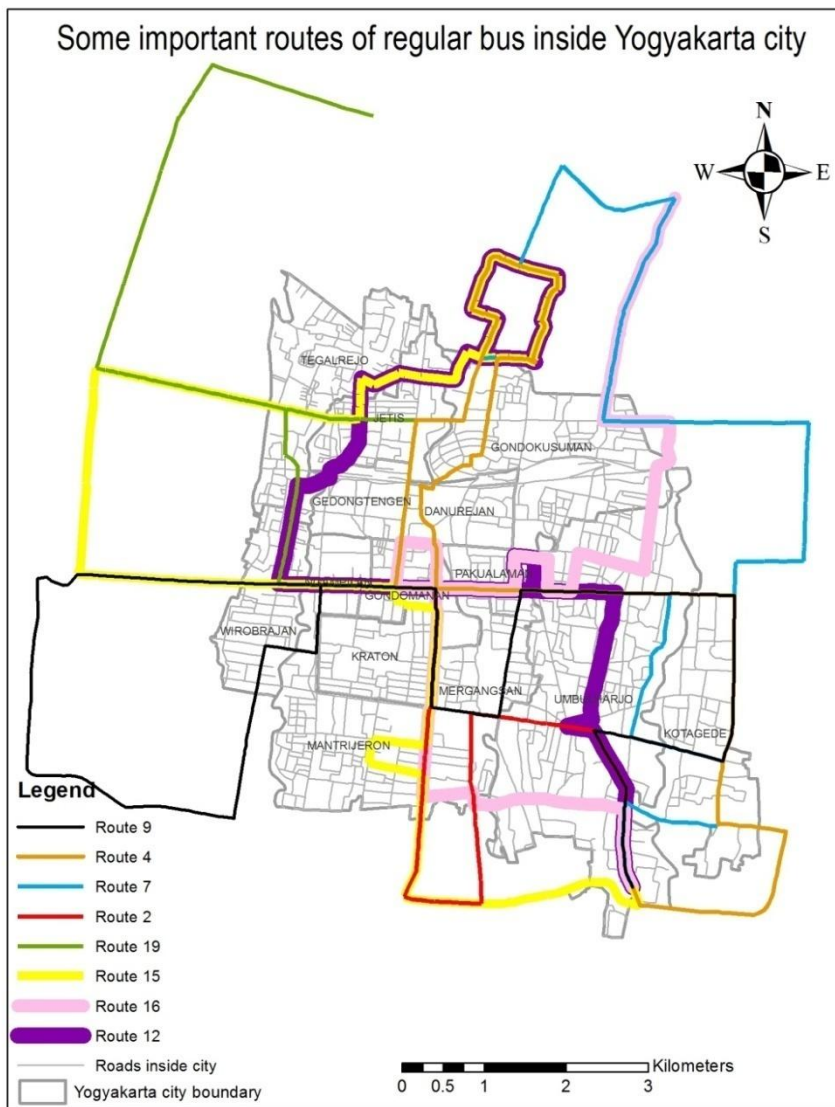


Figure 3-5: Some important routes of regular bus inside the city

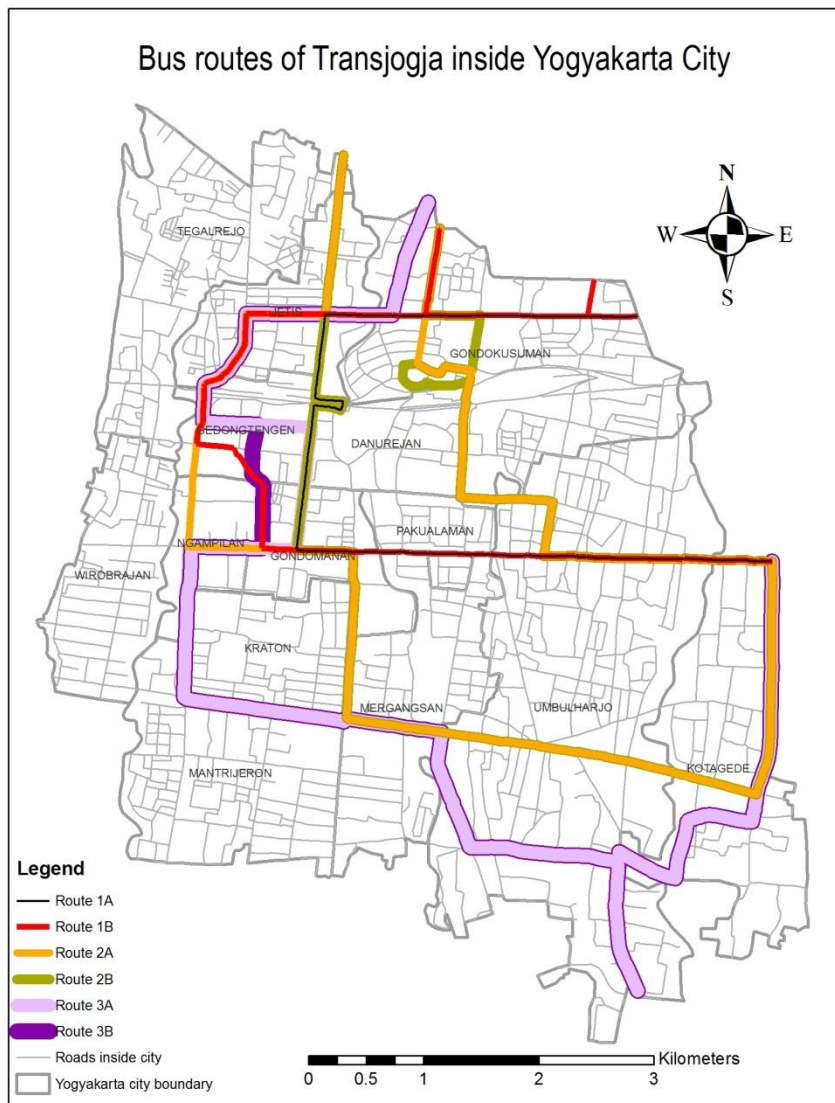


Figure 3-6: Bus routes of Transjogja inside Yogyakarta city

The regular bus in Yogyakarta comprises 19 licensed routes, although only 16 routes are operated with a total vehicle allocation of 59. Three routes 1, 8, 13 were closed because of the low demand. Most of these existing regular bus services are owned privately and they operate it completely from commercial point of view. So no systematic network planning process is used during running the regular bus. The driver always compete with others buses to pick up passengers from route and try to get the pickup spot first and to do so; they often cause safety problems for passengers. The route length varies from 25 km to 62 km. Bus frequencies are extremely high but the load factor is very low. The average headway is 12 seconds. The average load factor is 27 % which is lower than five years ago, i.e. 36 % (Munawar, 2008). It means that the demand has decreased sharply.

Transjogja bus is much more comfortable than the regular one. It uses air condition inside the bus. It does not use exclusive bus lane such as other BRT system like Trans Jakarta uses in Jakarta city, because of the limited space available for traffic in Yogyakarta. However, the bus can only stop at a shelter due to height of the bus floor which is 80 centimeters higher than the road pavement (Munawar, 2008). The passengers, therefore, can only enter the bus at the bus shelter. There are some deficiencies remain from user point of

view during using Transjogja. From the statement delivered by Rizki Budi Utomo, ST, MT from Department of Transportation of Yogyakarta in a discussion *Discussing Trans Jogja Bus*, on 28/4/2011 at Center for Transportation and Logistics Studies explained survey results conducted by Department of Transportation of Yogyakarta recently showed that there was dissatisfaction of passengers on the Transjogja services, particularly waiting time (timeliness and schedule) and travel time of Transjogja. Only 27% of respondents who felt the bus service in terms of waiting time was good, while 20% said enough, and the remaining 55% stated less good, while for the travel time some 47% said less good, 11% said good enough, and 42 percent said good.

3.9. Transport Policy in Yogyakarta

According to the Indonesian Development Plan, traffic management strategies should be implemented as follows:

- a. development of mass transportation system which should be well-run with reasonable price, efficient and safe.
- b. development of road network which has the least negative environmental and social impact
- c. development of integrated public transport system
- d. development of traffic management strategies to achieve.

3.10. Revitalizing Public Transport in Yogyakarta

Like any other rapid growing city in the developing world, Yogyakarta has not escaped from the impacts of the poor public transport services. Public transport is about connecting people with the jobs, education and opportunities they want to pursue (Keneally, 2011). In the evaluation of Yogyakarta's the public transport system, service quality is perceived as an important determinant of users' travel demand, following (Prioni & Hensher, 2000). Considering public transport, both operators and authorities need to understand how consumers evaluate the quality of the service offered. Understanding people perceptions about these facilities provides useful market information which can be employed to identify shortcomings in current facilities, to develop new facilities, to develop and justify planning strategies and/or evaluate usefulness in achieving agency objectives (Shafer, et al., 2000).

The growing nature of any urban city has forced to rethink on the existing public transport modes within the city. TQoL can be applied in public transport because the purpose and evaluation techniques used are well suited for the understanding of passengers' journey. Rather than measuring one or two components, it evaluates many different elements in one holistic model (Carse, 2011). If we try to develop the TQoL concept accompanying set of indicators in the context of Yogyakarta, specially looking at exiting two bus systems, a further modal shift from motorcycle to public transport can be stimulated. As such, the output of the TQoL study can work as an illustrative tool for analyzing and communicating information to politicians and decision-makers to help them identify where to invest in future transport systems.

4. METHODOLOGY

This chapter gives an over view of the methodological approach in addressing the research questions of the study. The research design adapted three phases of the research and describes all relevant and required data including the data sources and methods that are being used.

4.1. Research methodology

The research methodology in this thesis, gives an outline of the steps to answer the research questions as described in table 1-1. The research design matrix of this study is shown in table 4-1 presents the data that were required, source of data collection and methods that were applied.

The research has the following consecutive phases:

- The first phase consists of problem analysis in which the main problems in the study area are discussed based on literature review. The issues that were looked at in this phase are the relationship between quality of life with sustainable public transport system.

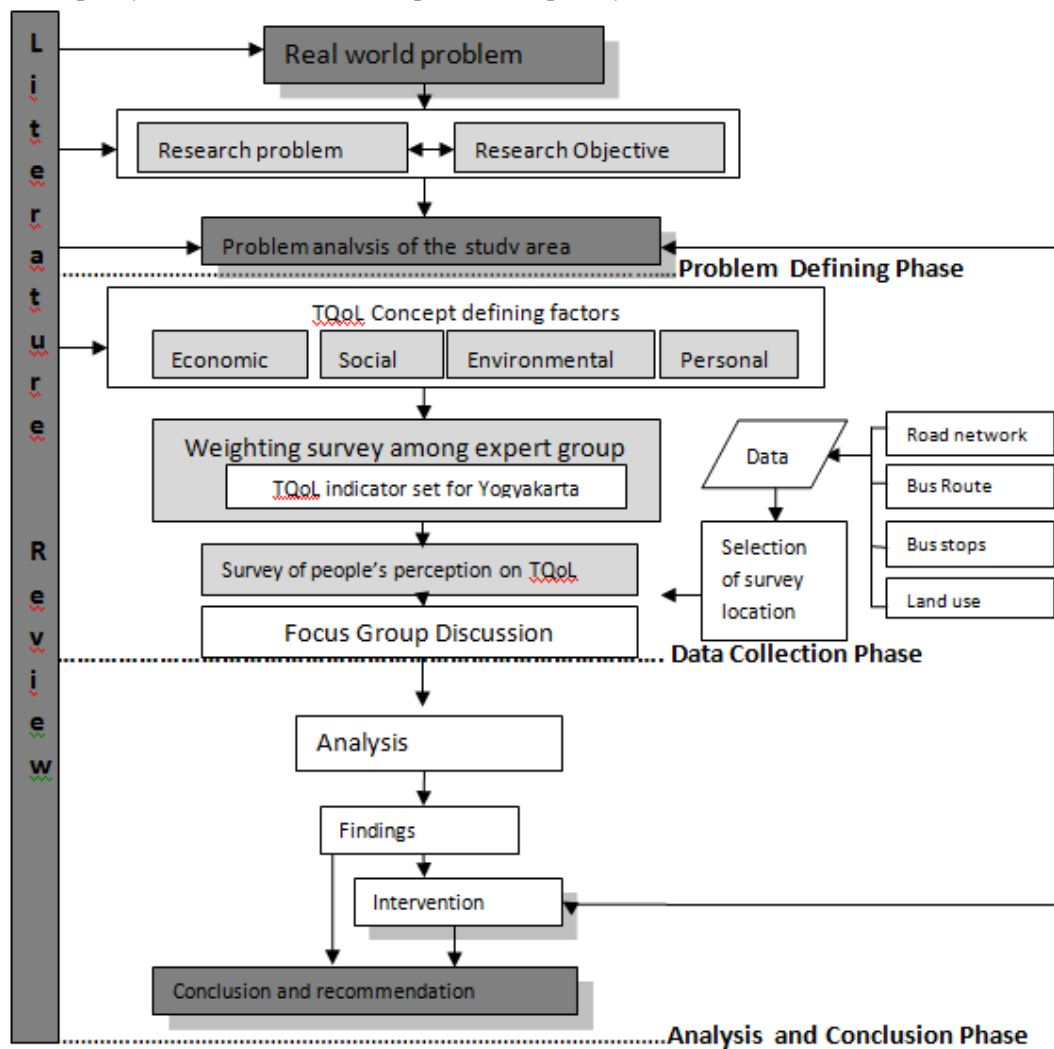


Figure 4-1: Research Methodology

- The second phase is the data collection. In this phase, the main factors of the TQoL concept (economic, social, environmental, personal) were used in the weighting survey among the expert group to identify a set of indicators within the context of study areas well as the relative importance of those indicators. Based on this set of indicators a questionnaire survey was developed to get information of people’s perception on TQoL. Secondary data like bus route, bus stop, land use etc. were used to finalize the location for the people’s perception survey. This survey was tested with some university students on how to conduct the questionnaire survey. Eventually the questionnaire survey was implemented.
- In the third phase of the research, the collected information from the survey was used for statistical analysis. TQoL score based on people’s perception about the journey quality were used to assess the two different types systems and explore differences between various groups to eventually arrive at possible interventions.

4.2. Research Design Matrix

No	Research Questions	Data requirements	Method Used
1	What are the present techniques being used for appraisal of public transport system?	Relevant literature	Literature Review
2	How to use TQoL concept in building factors according to the context of Yogyakarta?	Relevant literature, Weighting survey score	Literature Review, Weighting survey among expert group using Survey monkey
	What are the main indicators of measuring transport quality of life?	Weighting survey score	Descriptive statistical analysis
3	How can the proposed public transport system deal with the indicators that passenger prefer?	Primary data from the questionnaire survey, Secondary data	Descriptive statistical analysis
	Which indicators are getting higher quality score?	Primary data from the questionnaire survey, Secondary data	Descriptive statistical analysis
4	Based on the TQoL assessment, which improvements in the public transport system of Yogyakarta can be proposed?	Focus group discussion, Primary data from the questionnaire survey	Statistical analysis and discussion
5	How does TQoL concept perform as an appraisal technique for transport planning?	Focus group discussion, Primary data from the questionnaire survey	Statistical analysis and discussion

Table 4-1: Research Design Matrix

4.3. Data Collection Phase

4.3.1. Selection of Indicator for building the TQoL concept in the context of Yogyakarta

In developing TQoL concept for the city of Yogyakarta, the indicators are designed to measure mainly journey experience rather than sustainable transportation in the expectation that this will benefit transport

appraisal. TQoL has four dimensions as mentioned in literature review. In each dimension a set of indicators were chosen to establish the TQoL concept for Yogyakarta.

<p>Indicators for Economic dimension: Economy is vital for the development of a nation. Five economic indicators were chosen for this study. Each of the indicators can be described by the SMART objectives: Specific, Measurable, Achievable, Relevant, Time- bound.</p>		
Economic Indicator	Reason for choosing the indicators	Source
Reliability of travel time	Reliability of travel time is precise to the economic condition of TQoL because the time taken to travel can have an impact on QoL. If it takes someone over an hour to travel to the shops or work, then this could severely affect their experience of public transport.	Author
Closeness to opportunities by bus/ Employment	Opportunities by bus are specific to the economic condition of TQoL because employment is a major part of most people's livelihood. Not having good access to employment could be perceived as a major negative influence on a passenger's TQoL.	Adapted from Carse (2011)
Exclusive Infrastructure (parking facilities near bus stop)	Exclusive infrastructure and connectivity with other modes represent the influence of investment in transport on TQoL. While these indicators do not directly influential on the experience, but investments can indirectly affect TQoL.	Adapted from Carse (2011)
Connectivity with other modes like train		Author
Price of the journey	Price of the journey is important an aspect of TQoL. Because it is necessary to discover that someone is paying more on transport willing to pay extra for an improved transport service, delivers a good policy argument that the mode is providing poor TQoL.	Adapted from Carse (2011)
<p>Indicator for Social dimension: The issues affecting the social condition of public transport passengers can be represent by social indicators. Four indicators were chosen for the study area according to following SMART objectives: Specific, Measurable, Achievable, Relevant, Time- bound.</p>		
Social Indicator	Reason for choosing the indicators	Source
Bus Safety	Bus safety and journey safety are relevant to the social aspects of passenger quality because they all contribute to safety. Rather than including one quantitative measure, the subjective feeling of safety adds validity to the indicator.	Adapted from a survey report By PUSTRAL (2006)
Journey Safety (trained drivers to avoid accident)		Adapted from Carse (2011)
Accessibility for specific group (e.g. disabled people, elderly people, woman carrying babies)	Accessibility for specific group may not be specific to social TQoL for most people because they do not encounter any problem. But for passengers e.g disabled people, elderly people, women carrying babies can have difficulty in travelling. TQoL therefore needs to measure this issue through the quality of transport facilities.	Adapted from Carse (2011)
Availability of woman	Percentage of woman is higher than man in	Author

compartment	Yogyakarta. For large community of woman, it can be a considerable indicator for future planning.	
<p>Indicator for Environmental dimension: As the environment have a major effect on QOL, the environmental indicators are important. Pollution from the transport cannot only affect journey quality but also individual health. Two environmental indicators were chosen for this study. Each of the indicators can be described by the SMART objectives: Specific, Measurable, Achievable, Relevant, Time-bound.</p>		
Environmental Indicator	Reason for choosing the indicators	Source
Air Pollution	The combination of local air pollutants is relevant to TQoL, because it indicates possible health problems each individual face when they travel. The indicators are time-bound by the data production.	Adapted from Carse (2011)
Noise Pollution	Noise pollution is relevant to assessment of TQoL because it shows how noise affects QoL for each passenger.	Adapted from Carse (2011)
<p>Indicator for Personal Dimension: Personal indicator represents the individual journey quality of life. 7 indicators were chosen for this study. Each of the indicators can be described by the SMART objectives: Specific, Measurable, Achievable, Relevant, Time-bound.</p>		
Personal Indicator	Reason for choosing the indicators	Source
Distance from Bus stop/Access	Distance from bus stop is important component to a successful TQoL. To experience good journey quality; there need to have good access to public transport services.	Adapted from Carse (2011)
Cleanliness	Cleanliness of bus also sometimes bus stops affect the journey quality of passenger.	Adapted from a survey report By PUSTRAL (2006)
Age of the bus	Sometime age of the bus becomes a problem to serve properly and also people consider it in their journey.	Author
Availability of seats	Availability is a part of the personal mobility. It is relevant to TQoL for presenting how transport service provide comfort journey for its passengers.	Author
Information about bus schedule	Provision of information on public transport is important to include as an indicator on Public Transport Information because good advertisement and provision of relevant timetables can lead to passengers knowing all the various options available, which improves their QoL.	Adapted from Carse (2011)
Easiness to transfer from one bus to others using integrated ticket	Price of integrated ticket is specific to economic TQoL because it has concern on boost of fares of public transport. It can have a major impact upon journey experience.	Adapted from a survey report By PUSTRAL (2006)
Image of bus	Modern and stylist bus gives a good impression on people's journey experience.	Adapted from a survey report By PUSTRAL (2006)

Table 4-2: List of selected indicator for TQoL for the study area

4.3.2. Weighting survey for the indicators of TQoL from Expert Group

A weighting survey from the expert group experience was set up to take place for getting the indicators of TQoL of Yogyakarta. The people from the expert group were carefully selected so that people related with public transport issues were identified. In total 14 people were consulted, including transport experts from Pustral organization, official from TransJogja, authority from regular bus system, and passengers using bus as public transport.

Given the limited time available for actual fieldwork, before the fieldwork, a survey questionnaire was made with the help of the web side of survey monkey (source: http://www.surveymonkey.net/MySurvey_EditorFull.aspx?sm=1ZZVnDtZRzcSQcez2ODEUjVogsyr6FVC0TN87d%2fPOqI%3d). The link was send to Mr. Arif Wismadi, a public transport expert of Pustral. With the help of the transport experts of Pustral, the questionnaire was converted into the local language of Yogyakarta and distributed among the selected expert group. The purpose of the survey was to have an idea of TQoL of Yogyakarta based on their experience was made clear in the survey form. All of the indicators were considered important to them when they travelled on public transport. The following steps were followed to in the questionnaire:

- The participants were asked to rank the 4 dimensions (economic, social, environmental, and social) according to the importance level of each dimension in the assessment of Transport Quality of Life by people in Yogyakarta. The most important dimension gets rank 1; the second important gets rank 2, the third important gets rank 3 and the 4th important gets rank 4.
- Each indicator was also weighted according to the importance level. Likert-scale format was used for the question.
- If the focus group wanted to include any new indicator, they were allowed to mention that with reason.
- The participants were asked to choose the best 5 indicators from the given set of indicators.

The final output of the weighing survey for indicators of TQoL from the expert group survey was the input for the questionnaire survey for the people's perception.

4.3.1 People's Perception survey Design

This stage involved field survey whereby passengers using the bus systems were interviewed. Before starting the survey, questionnaire were prepared in local language with the help of some university students who assisted to conduct the questionnaire survey about people's perception on TQoL.

4.3.1.1 Survey Questionnaire Design and scale development

The survey questionnaire was opened with a brief introductory statement explaining the purpose of the field survey and the potential benefits of the research for public transport in Yogyakarta. In order to come up with justifiable TQoL, the questionnaire had two parts: TQoL assessment parts and the passenger's identification part. TQoL indicator assessment part, a suitable design and implementation procedures were followed to get a good response rate. In the questionnaire, the respondents were asked to rate the indicators on a 5 point Likert-scale. In the passenger identification section will consist of demographic information of respondent, age, address, employment status etc. These elements were used for the discussion and interpretation of study's findings. The survey sample questionnaire is added in appendix D.

4.3.1.2 Data collection technique

It was decided to use face-to-face personal interview method in collecting information from the sampled population. All though from Carse's experience (2011), it was found that delivered and mailed back

method was suitable to have detail information. But this could not be feasible in this particular study due to given time and budget constraint since delivered and mailed requires more time and budget resources. Secondly, it was necessary and important to observe how the respondents respond according to the questionnaire, including some of the qualitative statements they made. So the personal interviews were relevant in this study.

4.3.1.3 Sample Size

The sample size depended mainly on the available resources and time. Sample size usually need to be sufficient large enough to observe the variation in different groups. 162 respondents from regular bus service passengers and 246 respondents from Transjogja passengers were interviewed during the survey.

4.3.1.4 Sample selecting points

Before starting the survey, following three aspects were considered to select the survey points. Transjogja runs in 6 routes and the regular bus system runs in 19 routes. Some routes of regular bus system are connected with the Transjogja route. Transjogja has more than 70 bus stops throughout the city. The bus stops were selected based on following aspects:

- Presence of various social and economic activities in the surrounding like schools, universities, shopping malls, offices, business places, hospitals etc.
- Bus stops with connections to different routes of the regular bus system
- Bus stops with connections to different routes of the Transjogja bus service.

Detailed information of the selected survey stop location is given in table 4-3. The locations of the

Name of bus shelter (Transjogja)	Location name	Activity of the surroundings	Connecting routes of Transjogja	Some connecting important routes of regular bus system
Santika Selatan	Santika	Shopping malls, hotels, book store, and offices	1A, 1B, 3B	4, 19
Santika Utara	Santika	Shopping malls, hotels, book store, and offices	1A,1B, 3B	4,19
Garuda	Garuda	Business, shopping center, government offices	1A, 2A, 3A	4,16,19
Giwangan	Giwangan Terminal	Busy bus terminal	3B,3B	2,7,9,16
Kusumanegara 3	Kusumanegara	Crowded by students and office workers	1B, 2A, 2B	4,9
Kusumanegara 4	Kusumanegara	University area	2A, 2B, 3A, 3B	4,9, 16
Taman Pintar Utara	Taman Pintar	Office, school, business	2A	2,4, 9, 15, 16
Taman Pintar Siletan	Taman Pintar	Office, school, business	2B	2,4, 9, 15, 16

Table 4-3: Sample selection bus stop information

According to the land use of Yogyakarta, most of the survey location points were chosen in the settlement area, where we can find proper urban activity. In first instance it was decided to choose 3 or four bus stops of Transjogja, but that was during the actual data collection. Because, if we want to take the details

of all the routes of Transjogja, we need to consider bus stops both sides of one road. For example, on both sides of location Taman Pintar two bus stops are situated and among them one consists of route 2A another consists of route 2B. Bus shelters Garuda and Giwangan are in one way direction. The survey location points of Transjogja passengers and regular bus are showed respectively in figure 4-3 and 4-4. Only one bus shelter is situated in one side on the road, no bus shelter is situated on the other side on the road. The Kopma UGM bus stop which is near the University of Gadjah Mada was chosen for an experimental survey to see how the survey worked.

The target respondents for this interview were both regular and non-regular bus users which were selected by using non-probability sampling method.

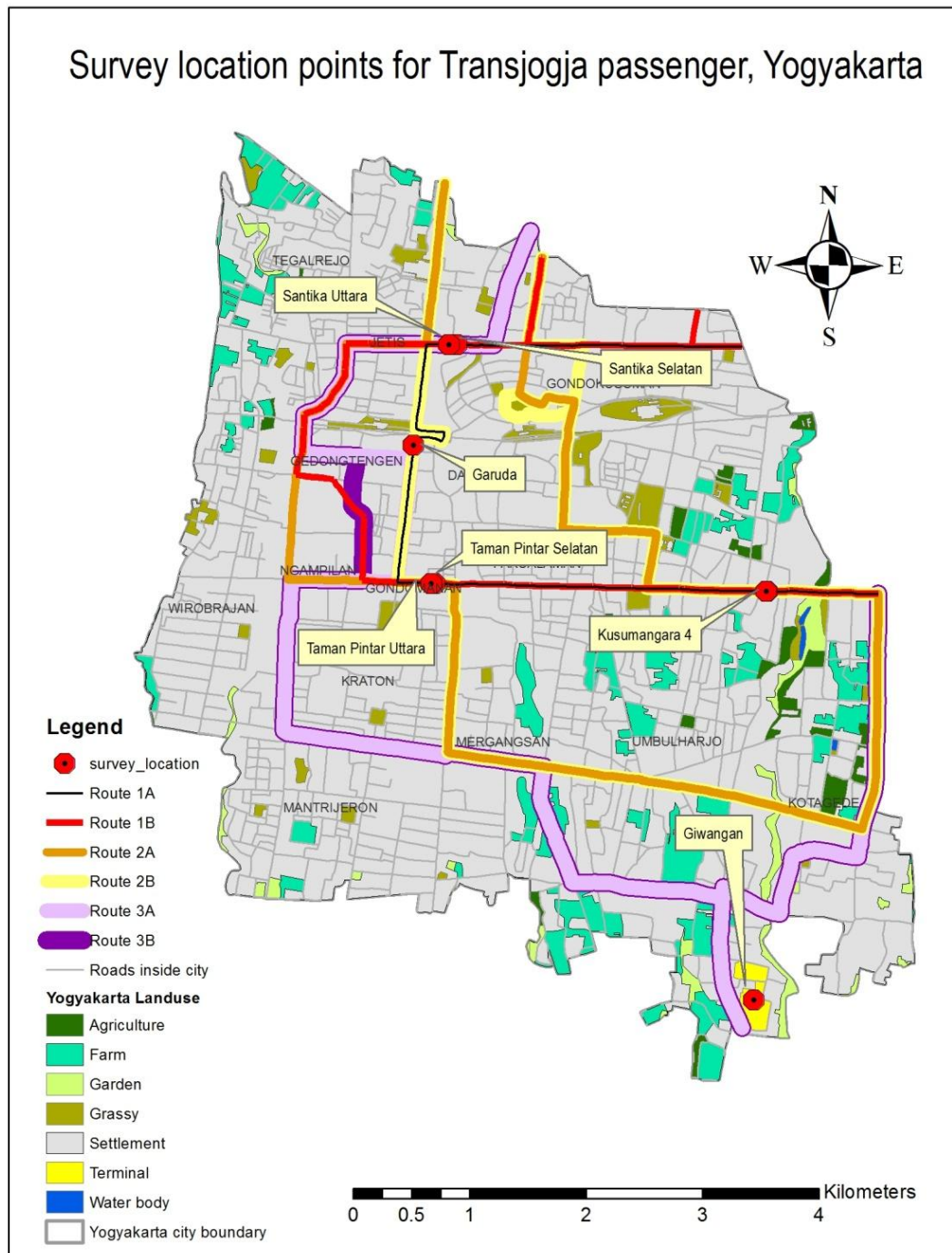


Figure 4-2: Survey location points for Transjogja passengers:

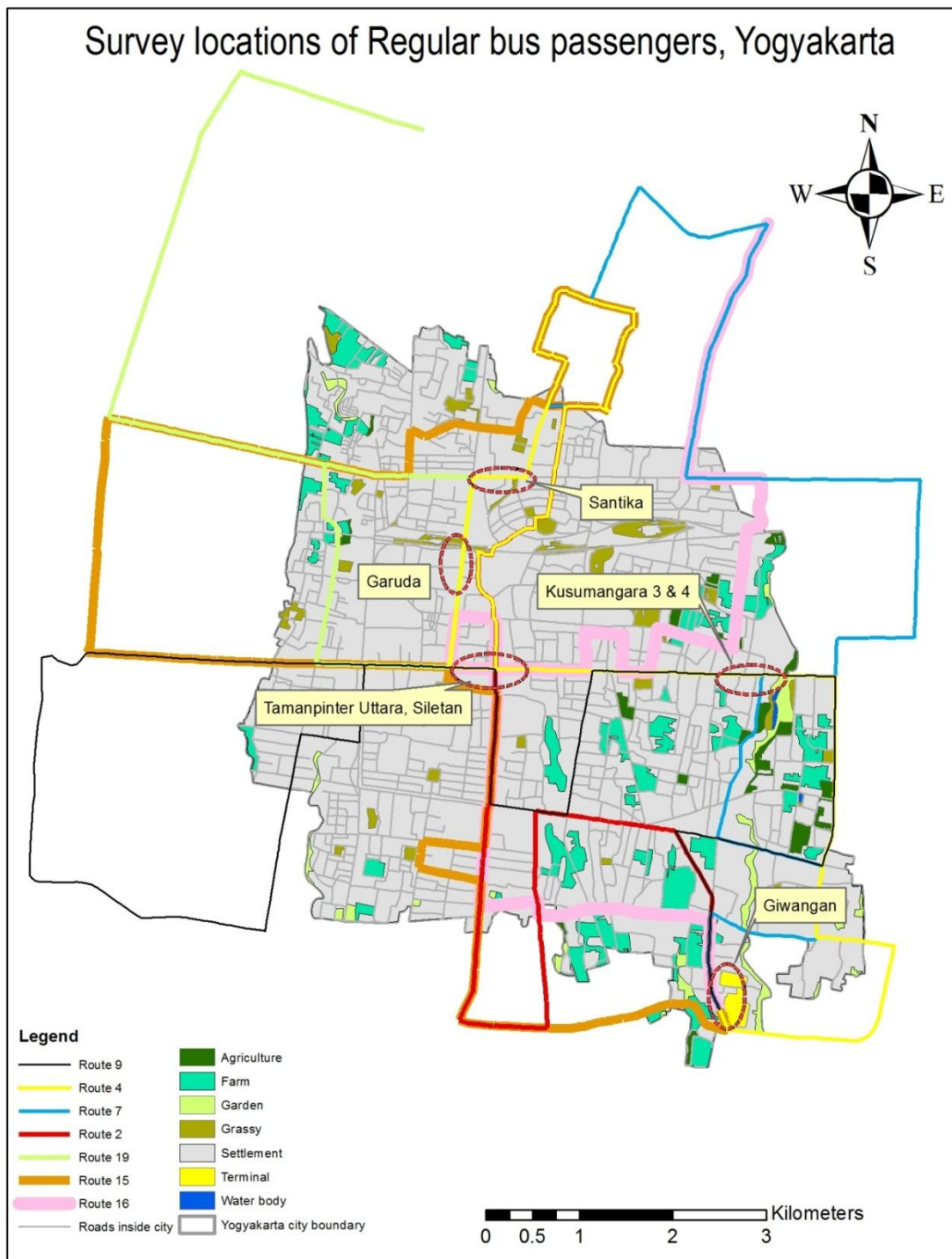


Figure 4-3: Survey location of regular bus passenger, Yogyakarta

4.3.3. Field Work Stage

During this stage all primary and secondary data were collected. The collected data were entered in data sheets for further processing and analysis.

4.3.3.1. Survey Preparation

The questionnaires and sampling strategy were revised based on the ideas and experiences gained from the discussion with the local transport experts and the group of surveyors before the main survey. The survey questionnaire was translated into the local language called Bahasa and made ready for training the interviewers. Also, visiting authorities from Transjogja and regular bus system were going on throughout the field work period simultaneously with the surveying process. The process was somehow cumbersome as there was a need for permission to carry out the survey in the different bus stops. As soon as permission was given, the survey was executed.

4.3.3.2. Recruitment and Training of Surveyors

To ensure the quality and validity of the data, capable surveyors were used. Four surveyors were recruited and trained for two days to make them understand the questionnaire and surveying techniques. The goals of the surveyors training were the following:

- Making the surveyors understand the specific research goals and strategy. It was necessary for the surveyors to be better informed about the subject, so that they can easily handle the questions from the respondents.
- Secondly, for teaching the surveyors the data collection technique (face-to-face interview).

4.3.3.3. Pilot Survey

The objective of the pilot survey was to test the contents of the questionnaire and logistics of the survey process. The pilot survey was conducted into two bus stops: Kopma UGM and SMP 5. Total 20 samples were collected. It took about 8 to 12 minutes to complete each questionnaire. After the pilot survey, the questionnaire was revised and things that were not clear were discussed and thus served as a guiding tool for better preparation of the main survey. Before hand, the idea was to interview the passengers while waiting for the bus as well as those leaving the bus after the journey. But interviewing the people waiting for the bus inside the bus stop turned out some time difficult because most of time the interviewers could not finish the questionnaire because the passengers had to get inside the bus. So the passengers who came out the bus after having their journey (for Transjogja and regular both) and passenger who had transit in that bus shelter (for Transjogja) were also considered as selected strategies for the final survey.

4.3.3.4. The Main Survey

As a preparation of the main survey, a general observation and tour of the city developments along the bus stops was made. Necessary logistics required to carry out the survey like printing of the questionnaires, transport arrangements, payments for interviewers, supervision arrangements were all organized before the main survey.

It took approximate one week to have a permission letter from the municipality and an official request letter was issued from Pustral to get the permission as early as possible. The main survey started from 30th November 2011 and lasted for 6 days as originally planned. In total a team of 4 surveyors were employed to carry out the whole survey. The survey was done in different places. So I had to look around every place for some times every day. During the survey period, every day at 7 pm all the surveyed papers were used to checked in front of the survivors and a strategy for the next day survey used to be planed. Some photographs from fieldwork are displayed in figure 4-5



(a) Meeting with Transjogja authority



(b) Meeting with surveyors



(c) People's perception survey of Transjogja passenger with the help of local surveyor near the bus shelter



(d) The survey attracted the attention of the local press



(e) People's perception survey of regular bus service passenger with the help of local surveyor



(f) Focus group meeting on the last day of field work to show some partial result from the survey that was conducted

Figure 4-4: Data collection and field work observation

4.4. Secondary Data

Census data for the whole province of Yogyakarta for year 2005 was obtained from the Centre for Transportation and Logistics Studies, Gadjah Mada University. This data was provided by the Statistics office of the province. Knowledge on planning system for public transport facility was gained from the visit Transport office of Yogyakarta.

A list of data collected from secondary source is provided in table 4-4.

Type of Data	Description	Data Condition	Source
Spatial data	Administrative boundary, province, district, sub-district, and village	GIS data (vector)	Pustral, UGM
	Land use of Yogyakarta	GIS data (shape)	Pustral, UGM
	Road network	GIS data (vector)	Pustral, UGM
Demography data	Population data	Document hard copy	BPS- Statistics of DIY
Spatial data	Transjogja bus shelter	GIS data (point)	Pustral, UGM

Table 4-4: Secondary data list with source

4.5. Data Preparation

The first task after field work was preparing the data collected for analysis. The major tasks were converting the data into statistical environment required for data processing. Each questionnaire was checked before entering into SPSS. The only respondents using Transjogja were included in the Transjogja bus dataset and the respondent using regular buses were included in regular bus dataset.

After entering the data into SPSS efficiently, variable were coded appropriately. The whole dataset were scanned to clear up mistakes made during data inputting for example entered route no. wrongly, some time gender wrongly entered. All the mistakes were corrected and entered properly into the database.

4.6. Challenges During Fieldwork

Some difficulties were faced before and during the data collection.

- Lack of sufficient data and information on socio economic condition.
- Spatial location of bus stop especially for regular was not obtained as per expectation because regular bus does have proper structured bus stop. It can stop anywhere.
- Language barrier was another difficulty during the field work time. As a consequence, survey had to be done with the help of the local surveyors and translators.
- All the documents obtained from planning and transport agency was in their local language. So translation needed extra time and effort.
- Due to time and financial resource constraint, sample size had to be limited.

4.7. Data Analysis

After assembling all relevant primary and secondary data, the data analysis focused on the indicators of TQoL of the study area. The research involved both qualitative and quantitative methods. The data collected data from individual perceptions survey were transformed from qualitative perceptions into quantitative values using Likert scale which is a scaling method between qualitative perceptions and quantitative values. Statistical package, SPSS and Excel were used as supportive tools to facilitate the analysis.

Output is presented in the form of spider diagrams of TQoL of the bus system of each route. The spider diagram is a nice representation of TQoL research. To add viability to the outcome of the result, a T-test was used to compare the significant differences between two groups. T-test was done to identify differences between the following groups: Transjogja Vs Regular, Male Vs Female, Age group above 30 and below 30. T-test was facilitated by the SPSS software. ARCGIS 10 software was used in making some maps, i.g. population density, route network of two bus systems (Transjogja and regular), and survey location with the help of secondary data.

4.8. Focus Group Discussion

The focus group session was set up to take place for the transport experts in Yogyakarta and was held in the office of PUSTRAL UGM (The Center for Transportation and Logistics Studies, Universitas Gadjah Mada) on 16th December 2011. The following participants attended the discussion.

Name of Participant	Organization name
Sulton Fatoni	Head of Road Transport Traffic (LLAJ) Division, Transportation Agency of Sleman regency
Hary Purwanto	Transportation agency of Yogyakarta City
M. Rudi Sulaksono	Yogyakarta Transportation Network (JARTRANS Yogyakarta)
Johnny Pramantya Sunu	Chairman of ORGANDA, (Road Transport Operators Association)) of Yogyakarta Province
Arif Wismadi	PUSTRAL (The Center for Transportation and Logistics Studies, Universitas Gadjah Mada)
Fajar Saumatmaji	PUSTRAL (The Center for Transportation and Logistics Studies, Universitas Gadjah Mada)
Deni Prasetyo	PUSTRAL (The Center for Transportation and Logistics Studies, Universitas Gadjah Mada)
Tri Listiati	PUSTRAL (The Center for Transportation and Logistics Studies, Universitas Gadjah Mada)

Table 4-5: Focus group details

The focus group discussion was consists of different part. The first part of the focus group was a general introduction on transport quality of life technique. Once it was clear that each person was involved in the discussion the debate was directed to the TQoL indicators. This started with a broad question on what are the most important factors to them when they travelled on public transport. A sheet of the partial results of the people’s perception survey (using primary) was distributed to them with the list of the indicators and each was debated for their relevance. After approximately thirty minutes of discussion, the final section of the agenda was raised. They were asked how they found partial results of the questionnaire survey and what aspects were easier to understand than others. The focus group session was concluded by gaining their opinions on what could be achieved in the future to improve their quality of life on transport. The session was held to confirm the validity of the indicators used in the main survey. Each of the

indicators was discussed and the contribution was confirmed by the respondents. Some had to be explained in more details, how all those indicators were chosen. Once they were explained all focus group members understood the importance of including the indicators.

5. RESULTS AND ANALYSIS

This chapter presents the detailed analysis of the research. First section includes the weighting survey results among the expert group, the second section includes the general characteristics of the sampled respondents, the third section includes descriptive statistics for different indicators of TQoL and the fourth section describe TQoL appraisal of Yogyakarta.

5.1. Outcomes from weighting survey of expert group

From answer of the ranking question of 4 dimensions (economic, social, environmental, and social) among the expert group economic is the most important dimension among all the other dimensions. Snapshot of the result from survey monkey is displayed in figure 5-1. Each dimension consists of set of indicators. Detailed results of each indicator from the weighting survey are included in Appendix B.

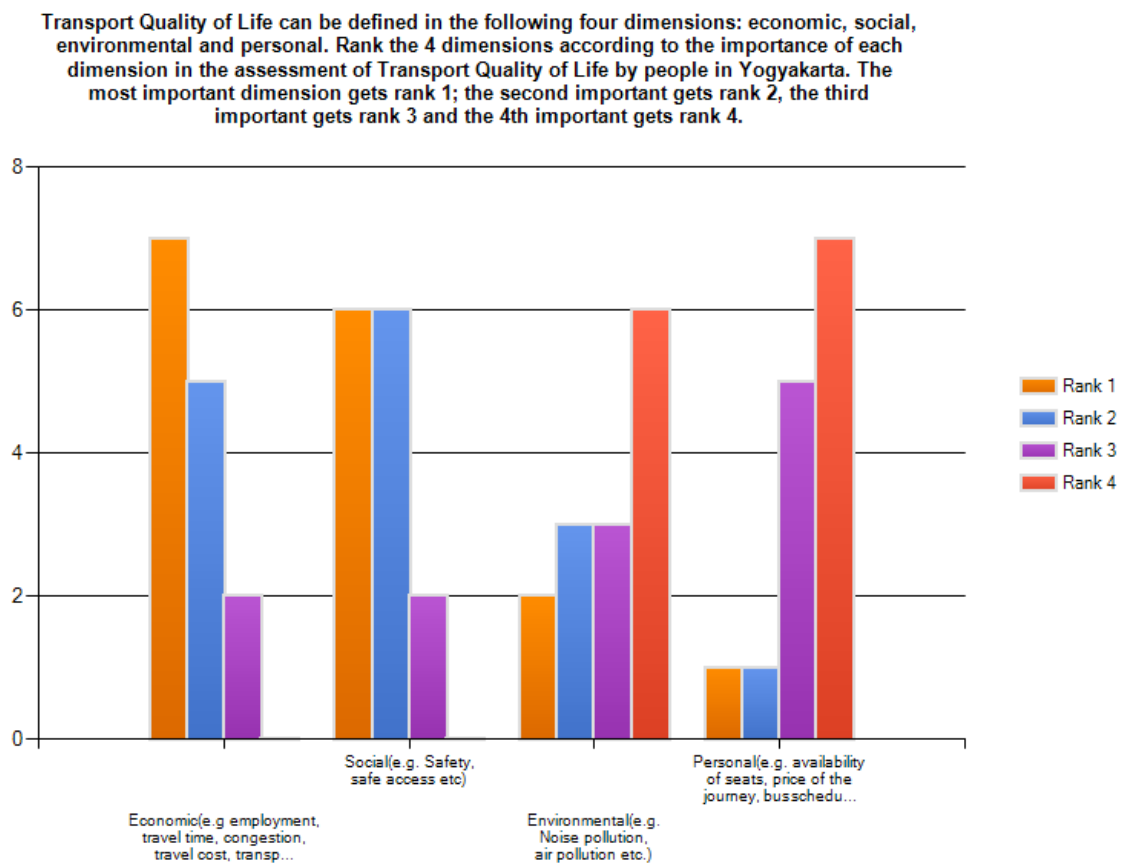


Figure 5-1: snap shot of the graph showing ranking level of four dimensions of quality of life (source: primary data)

Based on the importance level of each indicator, the average survey score was calculated of each indicator using the following equation: Average score of each indicator = $\frac{\sum(\text{Response count} * \text{weighting rank})}{\text{Total no. of respondent}}$

where

Response counts = total no. of response in each weighting rank

Weighting rank 1 = Of very little importance

Weighting rank 2 = Of little importance

Weighting rank 3 = It does not matter that much

Weighting rank 4 = Of some importance

Weighting rank 5= Of great importance

After having the average score the following results were found:

TQoL Indicator	Average Score
Reliability of travel time	4.86
Bus Safety	4.79
Information about bus schedule	4.71
Journey safety	4.71
Easiness to transfer from one bus to other bus using integrated ticket	4.57
Distance from the bus stop	4.5
Connectivity with other modes like train	4.5
Accessibility for specific group	4.43
Noise Pollution	4.43
Air Pollution	4.43
Closeness to job opportunities by bus	4.36
Exclusive infrastructure (parking facilities near bus stops)	4.26
Cleanliness	4.21
Age of the bus	4.07
Availability of seats	3.86
Price of the journey	3.86
Image of the bus	3.78
Availability of women compartment	3.57

Table 5-1: Average score of each TQoL indicator

The spider diagram was prepared based on the importance level of indicators. According to the focus group discussion, Reliability of travel time got the highest score (4.86 out of 5). On the other hand, image of the bus got the second lowest score (3.78 out of 5). All the indicators were within the range of 3 to 5. That meant all of the participants felt the indicators that were chosen were all important as a quality of life indicator.

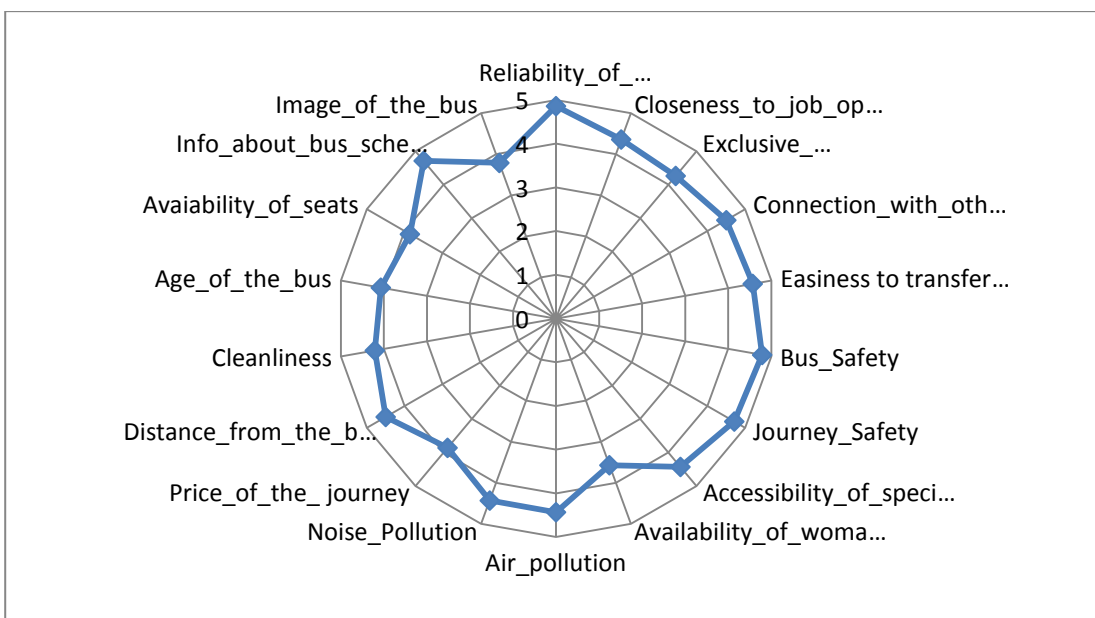


Figure 5-2: Spider diagram of TQoL indicators chosen by focus group

When the respondents were asked to add other possible indicator to include, only 8 persons responded on the following suggestions with explanation of why necessary.

Suggested Indicator	Reason behind the suggestion
Wide service network and reliability	<i>It is needed because it could provide better door to door service that comparable to provide transport reliability.</i>
Park and ride	<i>Park and ride will facilitate those people whose house is far from the bus stop</i>
Information of bus route integrated with other modes	<i>It will create smooth and easy transfer from one mode to other mode.</i>
No of bus or head way	<i>No. of bus or head way that will affect waiting time. In Yogyakarta, bus availability is limited. It will make people wait longer and make people not interested to public transport</i>
Road quality and road facility (traffic light, sign, marking etc.)	<i>This indicator will influence the level of safety and smooth traffic flow and reduce travel time</i>
Environment issue such as reducing fossil fuel consume etc.	<i>Needed to be aware of the environmental effect</i>
Connectivity between main route and feeder	<i>It will connect the sub urban area with the city. Usually people live in the sub urban area and work. The connectivity will affect time and cause.</i>
Travel time of public transport is longer than other mode i.e motorcycle	<i>Reducing travel time will attract people to use public transport.</i>

Table 5-2: Some few suggested indicators by the focus group

Most of the suggested indicators by focus group respondent are important in developing transport infrastructure. However, these indicators were not represent experience of people’s perception on journey quality, thus those indicators were not included in the final TQoL of Yogyakarta.

Due to time constraint, instead of all indicators best 6 highest average score of the indicators and price of the journey were finally selected from the expert group survey for the second people’s perception survey. The reason behind including price/fare of the journey was that public transport demand is relatively sensitive to fare changes (Bresson, Dargay, Madre, & Piroette, 2003), e.g. fare reduction can play a substantial role in encouraging the use of public transport. For having detailed results, some indicators are divided into sub parts as follows:

- Reliability of travel time – i) Reliability of bus departure waiting time, ii) Reliability of travel time on board
- Bus safety – i) Safety inside bus, ii) Safety inside bus stop
- Distance from Bus Stop- i) distance from origin to bus stop ii) distance from bus stop to destination

The average score of the selected indicators would be a considerable balance of 4 dimensions (economic, social, environmental, and personal) of TQoL. So the following indicators were considered as the input for the questionnaire survey of people’s perception on TQoL as follows:

Final Indicator lists of TQoL in Yogyakarta	Dimension	Code of indicator
Reliability of bus departure waiting time	Economic	E1
Reliability of travel time on board	Economic	E2
Safety inside bus	Social	S1
Safety inside bus stop	Social	S2

Information about bus schedule	Personal	P2
Journey Safety (e.g. Trained driver to avoid accident)	Social	S3
Easiness to transfer from one bus to other bus using integrated ticket	Social	P1
Distance from origin to bus stop	Personal	P3
Distance from bus stop to destination	Personal	P4
Connectivity with other modes like train	Economic	E3
Accessibility for specific group (e.g. disabled people, elderly people, women carrying babies)	Social	S4
Noise pollution	Environmental	En1
Air pollution	Environmental	En2
Journey cost	Personal	E4

Table 5-3: Selected final chosen indicator list for the questionnaire survey of people’s perception

The final TQoL of Yogyakarta in this study was assessed based on the following elements.

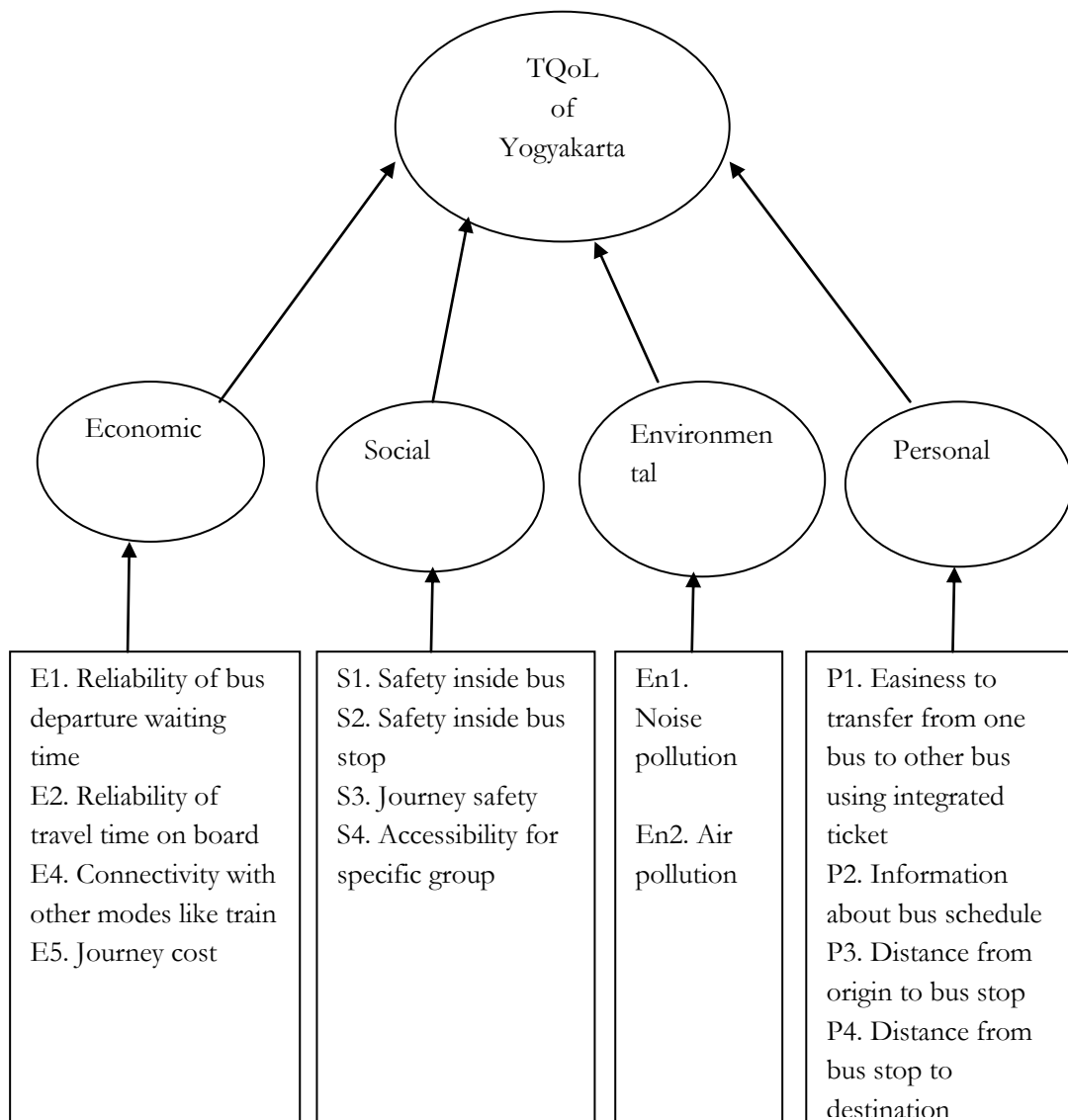


Figure 5-3: Final TQoL concept for Yogyakarta (Source: (Carse, 2011) and authod)

5.2. Characteristics of the Sampled Respondents

The data from the survey was analysed statistically to get an inside on how sampled respondents varied based on their socio-economic, demographic, travel characteristics. The data samples were descriptively analysed using SPSS and later the results were summarised in tables and graphs in Microsoft Excel sheet. The results of the socio- economic and demographic characteristics are discussed in the next section of this chapter.

5.2.1. Socio-Economic and Demographic Characteristics

General characteristics of the 410 samples were explored to get an idea of the collected data prior to running other analysis. Majority of the respondents were female (54.17% of total sample). The distributions of male and female respondents of two public bus systems of Yogyakarta are summarized in table 5.1. The results of the survey in terms of gender show relatively good representation of male and female respondents in the collected samples and a small variation shown by the comparison between the sampled population and the entire population of Yogyakarta city.

Gender	Frequency (from primary data)	Percent (from primary data)	Yogyakarta City population in 2008 (source: Kota Yogyakarta dalam angka, 2009)
Male	188	45.9%	48.86%
Female	222	54.1%	51.14%
Total	410	100	100

Table 5-4: Passenger distribution by gender (source: Primary Data)

Based on demographic characteristics of age group, education level, working status mentioned in table 5-5

Demographic Characteristics	Frequency %	
	Transjogja	Regular
Age Group		
<=15 years	8.9	23.2
16-30 years	50.0	41.5
31-45 years	23.0	12.2
46-60 years	13.7	14.6
>60 years	4.0	7.3
Education Level		
Primary	4.4	9.1
Senior high school	11.7	23.2
Junior high school	38.3	34.1
University degree	44.4	29.9
Not educated	0.0	2.4
Working Status		
Full time	15.3	14.0
Part time	4.8	6.1
Retired	5.2	2.4
Student	27.0	39.0
House person	9.3	6.7
Unemployed	7.7	7.3
Others (Enterprenor, teacher, worker)	29.8	22.6

Table 5-5: Demographic characteristic frequency details of surveyed data (Source: Primary Data)

Based on the age distribution, among the interviewed people, people of age group (16-30) year is the largest group. n others. Majority of the passengers are student (27% from Transjogja and 39.0% from regular). 44% of the respondent from Transjogja has university degree and 29.9% of regular bus service has university degree. In Transjogja no respondent was found uneducated.

Considering the purpose of the journey as a whole for both public systems together, 33.2% population use public transport to go back home, 16.8% use public transport for work. 13.2% population use public transport for visiting family friends, 7.6% for leisure/recreation, 5.4% for university, 2.7% use public transport for going to school_college, 1% use public transport for shopping, rest of the percentage use public transport for others purpose like go to hospital, go to village etc.

5.3. Descriptive Statistics for different indicators for TQoL of Yogyakarta

To achieve answers to the research questions, it was necessary to analyse some descriptive statistics like percentage count to see how well the sampled data explained the actual condition of the area.

During the survey, passengers were asked to describe about their level of the journey quality of public transport in one word. 55.5% passengers of the regular bus explained their journey quality as moderate and 50% of the passengers agreed while travelling by Transjogja, they experience good journey quality. The details results are shown in table 5.6.

Journey quality type (rank)	Regular		Transjogja	
	Frequency	Percent	Frequency	Percent
Very poor (1)	0	0	1	.4
Poor (2)	15	9.1	5	2.0
Moderate (3)	91	55.5	95	38.3
Good (4)	54	32.9	124	50.0
Very good (5)	3	1.8	22	8.9

Table 5-6 Results of overall journey quality

The descriptive analysis was performed using thirteen indicators. In each indicators 5 types of quality level (Very bad/very poor =1, Bad/poor =2, Moderate =3, Good=4, Very Good= 5) were analysed. For most of the indicators passengers chose moderate and good level of quality. The graphs of each indicator with the level of quality experienced by the passengers of both Transjogja and regular are shown appendix E.

5.4. TQoL Appraisal in Yogyakarta

5.4.1. Over all TQoL

The results were produced in SPSS and processed into spider diagrams in Microsoft Excel. . Three different frequencies mean, median and mode of two public bus systems (Regular and Transjogja) were produced. From details of table 5-7, mean can be use for the TQoL score to make the spider diagram. Figure 5-4 illustrates TQoL for Yogyakarta. The spider diagram compares the TQoL for the regular bus and Transjogja. The differences of different mode of transport can immediately be observed through the spider diagram. The more area covered by the diagram, the better the TQoL result. Thus, passengers travelling by Transjogja encounter a better experience compared to regular bus. Although simple conclusions could be made on the charts, t-tests provide a comprehensive evaluation of the differences between the modes. T-tests report if there are significant differences for each indicator of TQoL. If there are differences in TQoL accurate interpretation can be made on journey quality.

INDICATOR	Regular			Transjogja		
	Mean	Median	Mode	Mean	Median	Mode
Reliability of bus departure waiting time	3.23	3.00	3	3.19	3	3
Reliability of travel time	3.35	3.00	3	3.62	4	4
Connectivity with other modes like train	2.94	3	3	3.18	3	3
Easiness to transfer from one bus to other bus using integrated ticket	1.33	1	1	3.89	4	4
Bus Safety	3.39	3.50	4	4	4	4
Safety Bus Stop	3.60	4	4	3.91	4	4
Journey safety	2.94	3	2	3.63	4	4
Accessibility for specific group	2.83	3.00	2	3.40	3	4
Air pollution	2.75	3.00	2	3.85	4	4
Noise pollution	3.07	3.00	2	3.85	4	4
Information about bus schedule	2.50	2.00	2	3.57	4	4
Distance from origin to bus stop	3.04	3.00	2	2.91	3	4
Distance from bus stop to destination	3.36	3.00	2	3.13	3	2
Price of the journey	2.64	2	2	2.93	3	3

Table 5-7: Results of mean, median and mode of regular bus system and transjogja

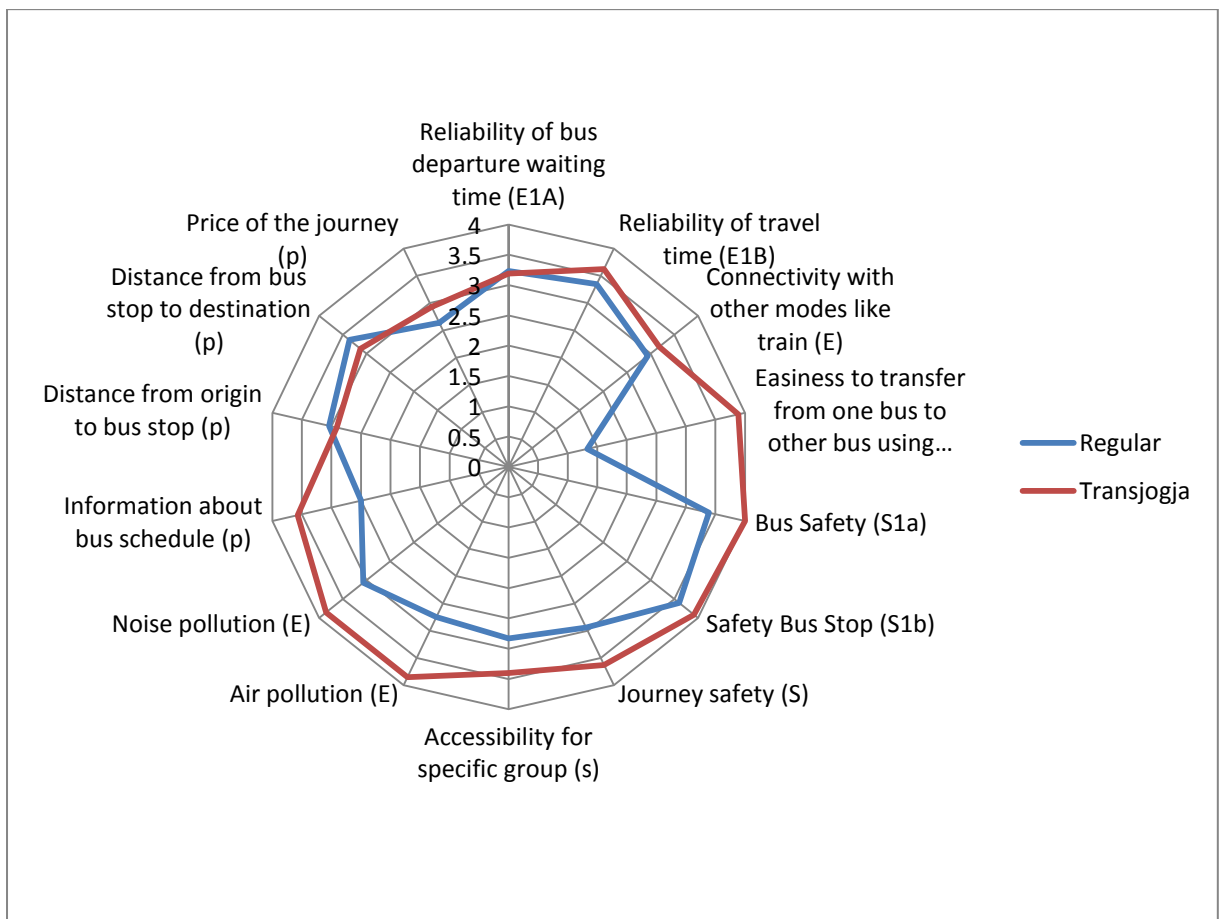


Figure 5-4: Spider diagram of TQoL of Yogyakarta, Indonesia

The more t-tests where the hypothesis can be rejected the greater the difference in TQoL. Two modes of transport are compared to test for the equality of means from two different samples. Independent T-test then carried out with the t-statistic and 2-tailed significance produced in table 5-8. If the significance level is ≤ 0.05 then it is possible to reject the null hypothesis that there is no significant difference between the two samples groups.

Indicators with no significant differences are highlighted in bold letters (see table 5-8). In the comparison between Transjogja TQoL and Regular bus TQoL indicators with no significant difference in TQoL are the reliability of bus departure waiting time (significant at .658), distance from origin to bus stop (significant at .257), distance from bus stop to destination (significant at .055). That means reliability of bus departure waiting time, distance from origin to bus stop, distance from bus stop to destination in short access to bus stops are very similar in the two bus system.

Indicator List	t-Stat	Sig.(2-tailed)
Reliability of bus departure waiting time	.443	.658
Reliability of travel time	-3.544	.000
Connectivity with other modes like train	-2.888	.000
Easiness to transfer from one bus to other bus using integrated ticket	-18.900	.000
Bus Safety	-8.251	.000
Safety Bus Stop	-4.534	.000
Journey safety	-9.089	.000
Accessibility for specific group	-6.525	.000
Air pollution	-12.234	.000
Noise pollution	-9.510	.000
Information about bus schedule	13.761	.000
Distance from origin to bus stop	1.135	.257
Distance from bus stop to destination	1.929	.055
Price of the journey	-3.669	.000

Table 5-8: T-Test comparing the mean of regular bus and Transjogja TQoL of Yogyakarta (source: primary data)

The TQoL spider diagram in figure 5-4, illustrates the difference between Transjogja and regular bus system and statistical variation in passenger experience presented is table 5-8 confirmed by T-tests.

Reliability of bus departure waiting time: In terms of indicator reliability of bus departure waiting time, TQoL score of Transjogja among the passenger itself is 3.19 and score of regular bus among the passenger itself is (3.23). But if we compare between the two system no difference remains in this indicator (significant at .658).

Reliability of travel time: According to the perception of passengers of regular bus TQoL for indicator reliability of travel time scored 3.35 which is lower than the TQoL of Transjogja (3.62). T-test shows the significant difference at .000.

Connectivity with other modes like train: TQoL for connectivity with other mode of Transjogja (3.18) is higher than TQoL of regular (2.94) bus. But the significant difference appears at .000. There remains a route of Transjogja with station Tugu but the shelter far from the station.

Easiness to transfer from one bus to other bus using integrated ticket: In terms of easiness to transfer from one bus to other bus using indicated ticket, Transjogja is getting TQoL score 3.75 which is in the range of good. Usually the people who travel long distance, they have to have transit is Transjogja shelter and they can use the same ticket to get into another bus of another route. But the people who are

using the regular bus, they feel bit difficulty is transferring from one bus to other using the integrated ticket while using Transjogja. So the indicator is getting score

Bus safety: Bus safety is an important issue during travelling. For this research bus safety was divided into two parts i) safety inside the bus and ii) safety inside the bus stop. For safety inside the bus TQoL score for Transjogja is 4 which is in the level of good because in transjogja, bus conductors usually remind the passenger about their belongings to make people careful about their stuffs. Bus safety TQoL for regular bus scored 3.39. Travelling in regular bus is not safe because of pickpocket issue especially when it is crowded.

Bus stop safety: TQoL score of bus safety is 4 out of 5. It stops only near the shelter. So people feel save inside the shelter all though the shelter has problem of lack of space during rush hour. In regular system, the bus stop does not function as how it should be. Passengers can stop the bus anywhere, so they do not need to wait for any specific bus stop. People usually wait based on their convenient location. That is why, according to the passengers from regular bus, TQoL score for safety inside bus stop is 3.63 which is above the rank of moderate level.

Journey safety: TQoL score of indicator journey safety for Transjogja is 3.63 and for regular 2.94. Majority of the drivers of Transjogja driver carefully, they obey traffic rule that makes less chance of reckless driving. The daily fee system causes the high risk burden to the operator of regular bus load as much passenger as they can although the capacity is overloaded ("ORGANIZATIONAL, OPERATIONAL AND FINANCIAL REFORM ON URBAN PUBLIC TRANSPORT INDUSTRY (CASE: YOGYAKARTA PROVINCE) "). This issue makes the driver drives carelessly, stops in everyplace and not paying attention to the passenger safety especially when they step up and down from the bus. So journey safety having significant difference of .000 is valid.

Air Pollution: The environmental factor reveals surprisingly giving a high TQoL score for Transjogja. For both air pollution and noise pollution TQoL score is 3.85. This reflects a positive picture of Trasjogja bus service because Transjogja use air conditions inside the bus; the door, windows are closed. So there is less chance of suffering from air pollution. For regular bus TQoL score for air pollution is 2.75 which is in between bad and moderate level (bad=2, moderate=3). The regular bus usually have black thick some which make people sick during travelling by regular bus. Air pollution indicator has significant difference at .000 for both Transjogja and regular bus system.

Noise pollution: For noise issue, regular bus has TQoL score 3.00 which belong moderate level. As we know air pollution and noise is a concerning issue these days for transport appraisal, but people from the city of developing countries like Indonesia are not that much aware of these pollution issue that anyone can be affected. It is needed to make awareness among the people about air and noise pollution.

Accessibility for specific group: TQoL score for accessibility for specific group in Tranjogja is 3.40. Still it has not reach the good level (score 4=good) due to some management issue as some of the passengers claim; e.g. in Transjogja there is specific space for the people who are using wheel chair, but it is not maintained properly when it is crowded. In regular bus no provision is available for elderly and people suffering from disabilities. So the TQoL score is 2.83 which is below moderate level (score 3= moderate).

Distance from Origin to bus stop: TQoL score for indicator distance from origin to bus stop for Transjogja and regular are 2.91 and 3.04. Statistically no difference appears in this indicator between the two bus systems (significant at .257).

Distance from bus stop to destination: Using regular bus, passenger can stop anywhere, so distance from bus stop to destination is near. Thus TQoL score for this indicator is 3.36 that below good and above moderate level. For Transjogja, TQoL score is 3.13. T-test shows no difference among the two systems for this indicator (significant .055).

Journey Cost: TQoL score of Transjogja for indicator journey cost is Transjogja has flat rate of ticket fare. People need to pay 3000 rupiah per single trip. Student has their cheap ticket option of 2500 rupiah. For long trip the price of the ticket is cheap. But for short trip, it is bit expensive. On the other hand, price of the journey for regular bus depends on the travel distance. It varies from 1000 to 3000 rupiah.

Over all from the assessment if we compare the Transjogja with regular bus, no significant difference appear between the two system for the indicator reliability of bus departure waiting time, distance from origin to bus stop, distance from bus stop to destination. On the other hand significant differences appear for 11 of the 14 indicators of TQoL. There is a difference in reliability of travel time (significant at 0.000). This is the same for connectivity with other mode like train, easiness to transfer from one bus to other bus using integrated ticket, bus safety, journey safety, accessibility for specific group, air pollution, noise pollution, information about bus schedule, price of the journey (all significant at 0.000).

5.4.2. TQoL by demographic characteristics

In this stage of in TQoL within each mode of transport based on demographic characteristics are analysed by two demographic characteristics - gender, age. The reasons for doing the comparison-

- Observation of both groups having similar levels of experience on TQoL.
- Assessment of biasness in the data.

5.4.2.1. TQoL by Gender

From the sample size, it was found that for both transport system, female respondents were higher than male (see table 5-4), so it was necessary to check is there any difference in TQoL among these two groups. TQoL by gender for Transjogja and regular bus system are shown in Figures 5-5, 5-6. For Transjogja TQoL score, there appears to be minimal differences in experience for male and female passengers.

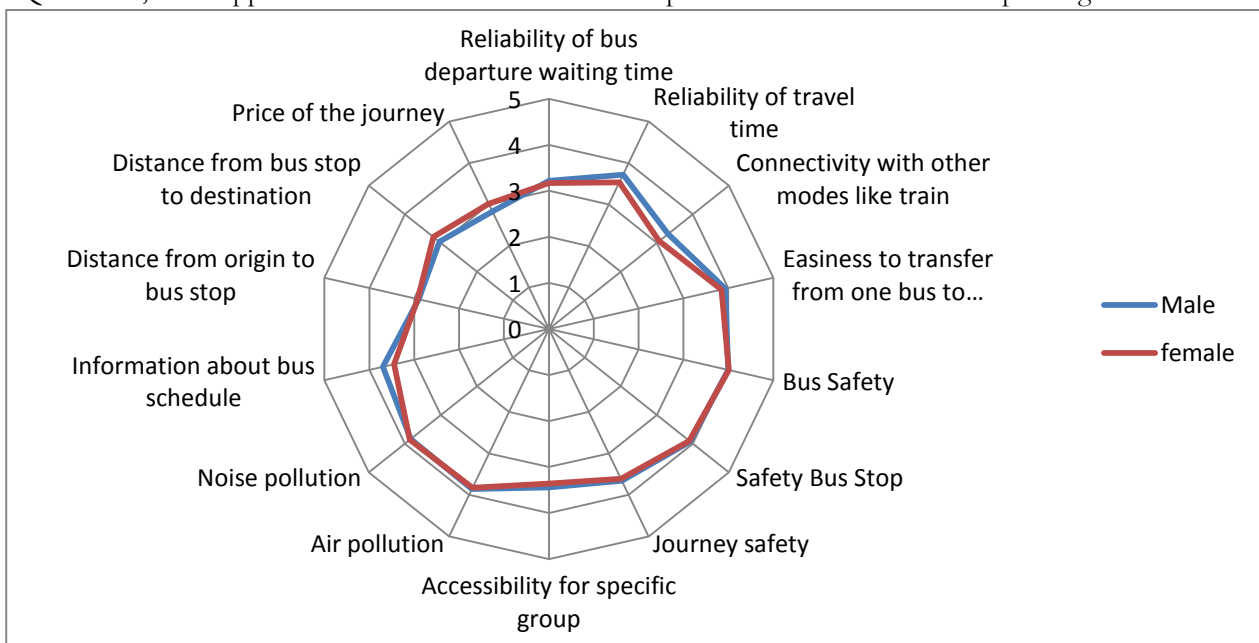


Figure 5-5: TQoL of Transjogja by gender

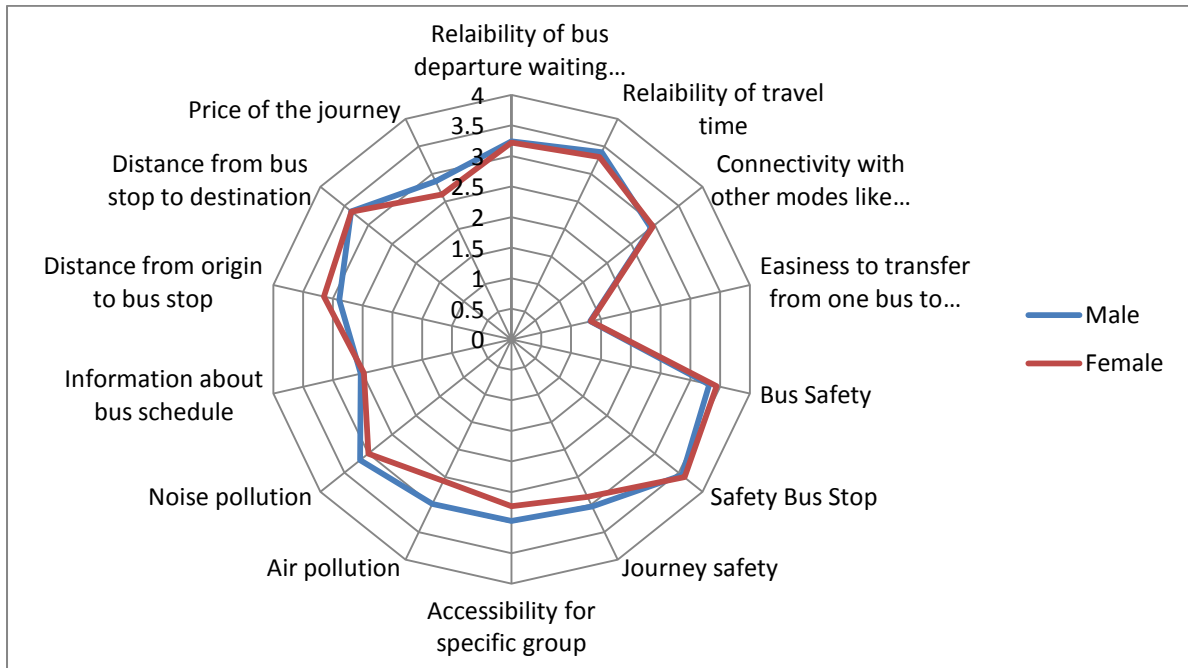


Figure 5-6: TQoL of Regular by gender

T-tests result in table F-1 showing only three indicators with significant difference in TQoL of Transjogja by gender- connectivity with other modes like train (significant at .013), information about bus schedule (significant at .015), price of the journey (significant at .004). For all other indicators the significance of the t-statistic is above 0.05. T-test results in table F-2 shows air pollution is the only one indicator with significant difference (significant at .006) in TQoL of regular bus by gender. For all other indicators the significance of the t-statistic is above 0.05. The reason for these differences is difficult to explain without further research. Although a general conclusion can be made that female are much more conscious than male that was found in further discussion in the primary survey from the given following notes by the female passengers of regular bus.

- “air pollution depends upon the bus type”
- “in the morning pollution is much than normal”
- “regular creates black thick smoke ”
- “the gas emission cause breath distraction”

5.4.2.2. TQoL by age

Yogyakarta city is dominated by students. Most of the student who do not have motor cycle use bus for travelling around. After getting driving licence at proper age (above 18), they switch from public transport to private mode. To study the Independent sample T-test compares two groups together., a proper balance among the two groups is needed. For this analysis age group above 30 and below 30 were used for the midpoint in the range to show the differences for older and younger adults. The difference in TQoL by age for Trasjogja and regular bus are presented simultaneously in figures 5.7, 5.8. In both public bus systems a very little difference is appeared in TQoL for passengers above and below 30 years. The shapes of the spider diagrams are close together which should mean fewer indicators with significant differences.

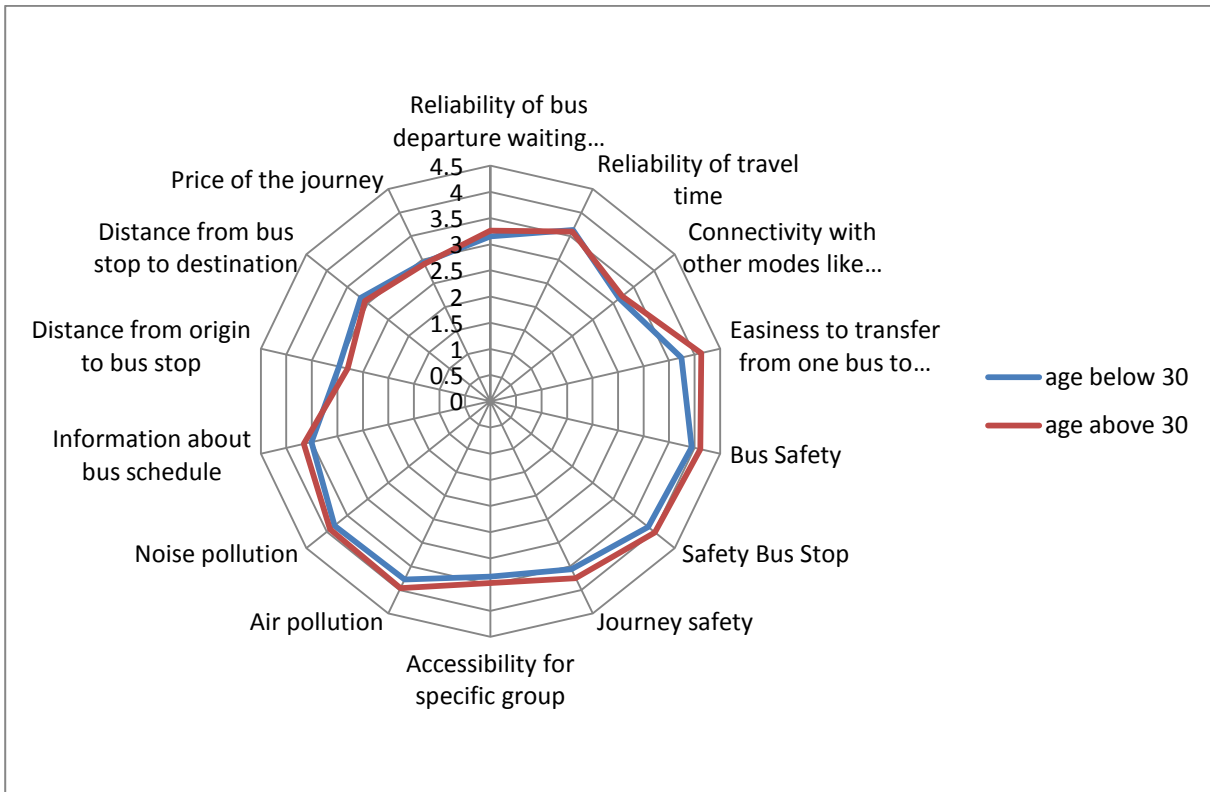


Figure 5-7: Transjogja TQoL, by age above and below 30

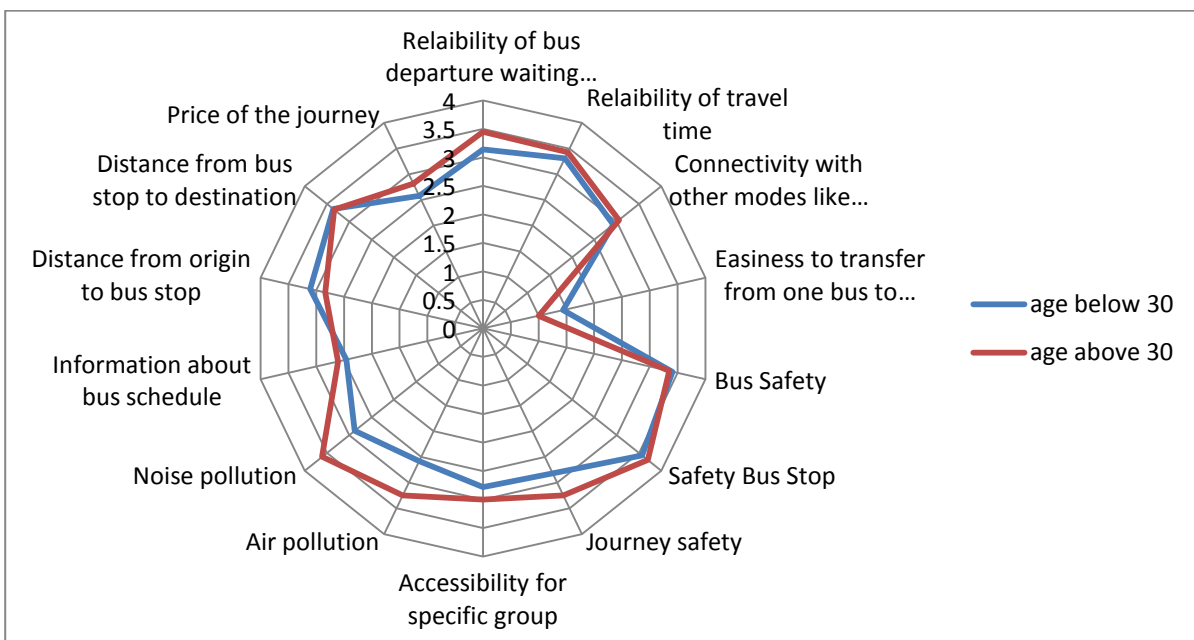


Figure 5-8: Regular bus TQoL, by age above and below 30

T-tests for Transjogja TQoL has shown in table F-3 four indicators with significant difference - Easiness to transfer from one bus to other bus using integrated ticket (significant at .000), bus safety (significant at .010), Safety bus stop (significant at .009), journey safety (significant at .010). On the other hand T-tests for regular bus TQoL shows indicators three indicators journey safety, air pollution, noise pollution are

significant at .010, distance from origin to bus stop is significant at .006 and price of the journey is significant at .047.

5.4.3. Details TQoL for each route of Transjogja

The analysis for each route in Transjogja will give a better understanding to know, is there any problem in any specific route. Based on the indicators (a) reliability of bus departure waiting time, (b) connectivity with other modes, (c) easiness to transfer from one bus to other using integrated tickets, (d) bus safety, (e) safety bus stop, (f) journey safety, accessibility for specific group, air pollution, information about bus schedule are almost same. Differences appear in distance from origin to bus stop and also from bus stop to destination. For these two indicators, respondent passengers expressed that bus stops are not equally distributed in term of distance. Some time it takes more than 30 min of walk to reach the bus stop, even they need to use other vehicle like motor cycle to reach the bus stop. Journey cost per trip for trasjogja is fixed (3000 IDR). It does not varies for travel distance, it only varies when passenger use special discount card. But some passengers are not happy with this fixed ticket price that makes the TQoL score variable.

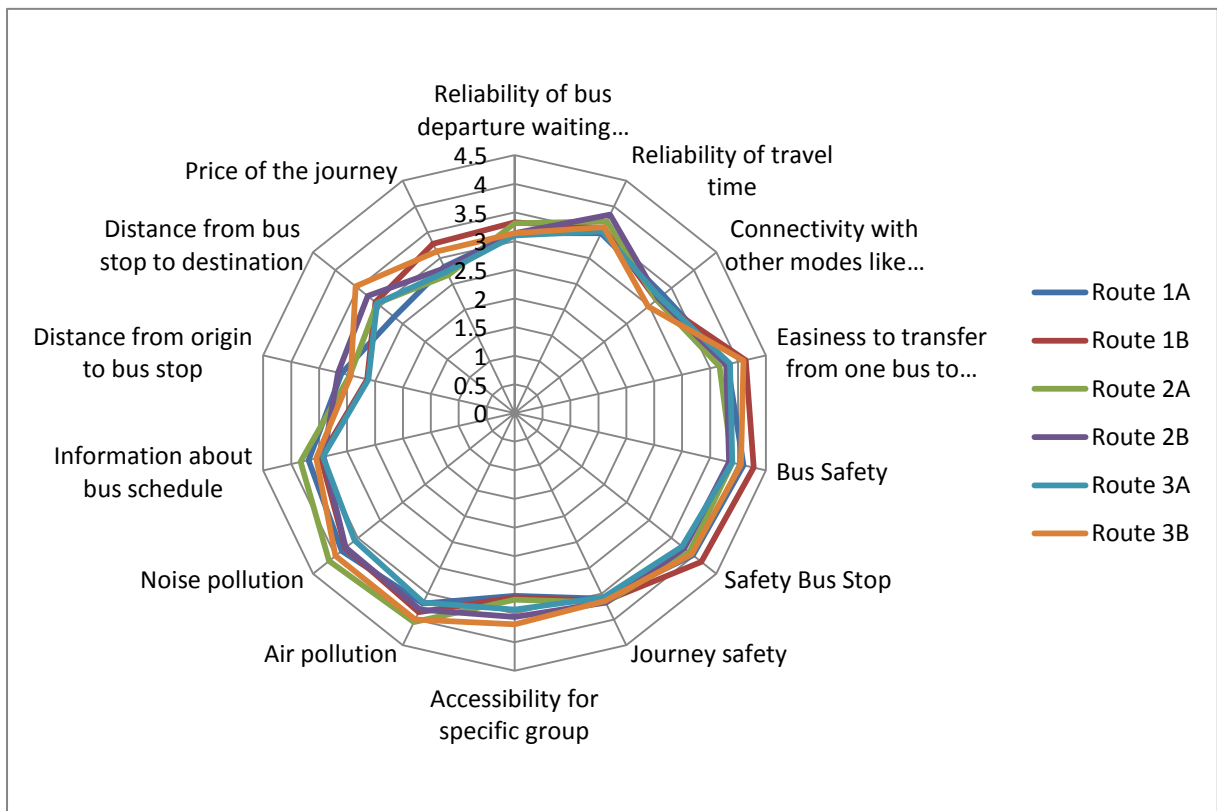


Figure 5-9: TQoL for each route of Transjogja

5.4.4. Details TQoL for some important route of regular bus system

Regular bus has 19 routes. The analysis for some important route in regular bus service will give a better understanding to know, is there any problem in terms people’s perception about the TQoL score of any specific route. Based on the indicator journey safety passengers of route 16 do not safe due to rush driving. Safety issue is very poor in this route. No facility is available for the specific group like: disable people, elderly. Passengers of route 2 have good accessibility to get the bus. Passengers from route 4 have good TQoL score in terms of reliability of bus departure waiting time. People from route 19 feel difficulty of transfer system of Transjogja from one bus to other using integrated ticket. Regular bus system does

not have information about their schedule, so the TQoL range for the passengers of all the routes remains between bad (when score=2) and moderate level (when score=3). of bus departure waiting time, connectivity with other modes, easiness to transfer from one bus to other using integrated tickets, bus safety, safety bus stop, journey safety, accessibility for specific group, air pollution, information about bus schedule are almost same. Differences appear in distance from origin to destination, distance from bus stop to destination, price of the journey.

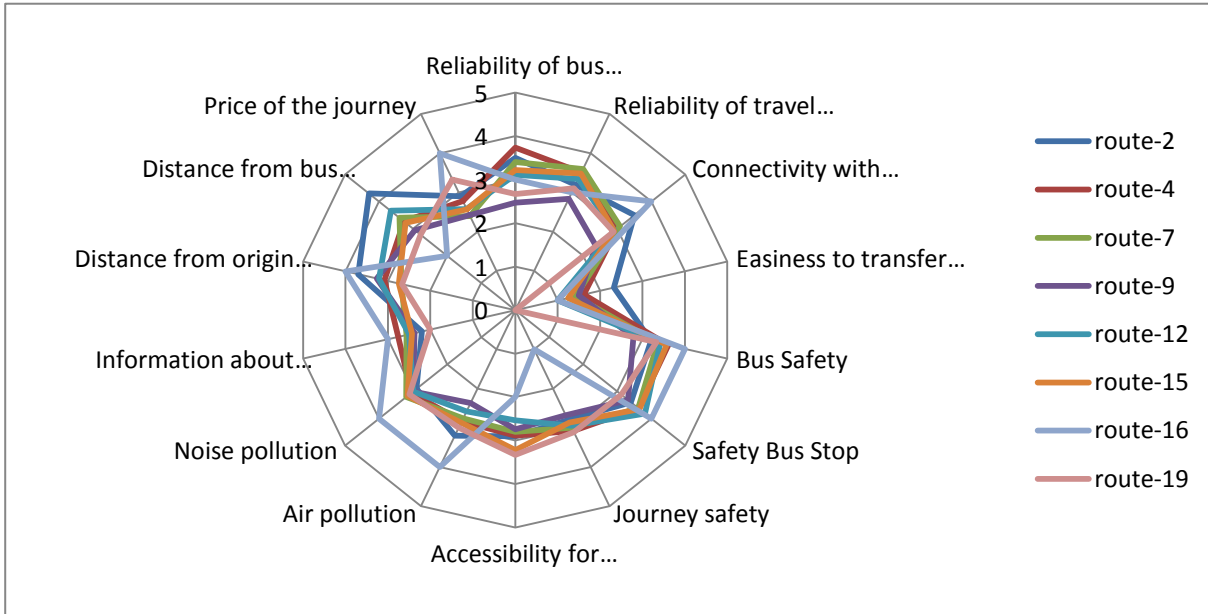


Figure 5-10: TQoL for potential routes of regular bus

5.5. Qualitative research results based on Focus Group Discussion

From the focus group discussion, all the factors were found important to them when they travelled on public transport. When discussion was raised regarding other possible indicators no issues identified. This meant that all of the participants felt that the indicators were important for their quality of life and no other new ones should be included. Prior to the focus group, this was one issue that needed clarity, and they agreed that inclusion does not add value into quality of life. The group also questioned the score of pollution issue. From the survey results it was found that QoL score was better in terms of pollution but it should not be. The reason behind this is the people from the city of developing country like Indonesia are not aware about pollution. Somehow they are used to live within polluted environment. So air pollution, noise pollution is not that much concerning matter for them.

6. DISCUSSION AND FINDINGS

6.1. Results from the TQoL appraisal and its policy implication

Based on results, it is found that, with the help of the TQoL concept public transport system assessment can be done easily. With TQoL more than one transport mode can be evaluated e.g. two types of public bus transport systems of Yogyakarta are evaluated based on people's perception (see figure 5-1). Using people's perception experience, this study shows the aspects the present public bus services of Yogyakarta provide inefficient, unproductive, unsafe level of services. Bus departure waiting time, safety, long walking distance from origin to bus stop or bus stop to destination are some of obvious problems found in this study that confront the users in their quality of life.

As it is mentioned that TQoL is measured based on 4 dimensions (economic, social, environmental and personal), after the analysis we can say that regular bus system provides higher TQoL more on social and economic aspects. The first two highest TQoL belongs to social dimension i.e. safety bus stop (3.6), bus safety (3.39) and the 4th and 5th highest indicators belong to economic dimension i.e. reliability of travel time (3.35), reliability of bus departure waiting time (3.28). On the other hand, Transjogja provides TQoL more on social and environmental aspect. For Transjogja the first two highest TQoL score belongs to social dimension i.e. bus safety (4), bus safety (3.39) and the 4th and 5th highest indicators belong to environmental dimension i.e. noise pollution (3.35), air pollution (3.35). So result according to peoples' perception survey both of the public transport systems of Yogyakarta are not performing according to the importance level of four dimensions of quality of life that the transport expert where economic dimension belongs to rank no. 1 (see figure 5-1).

In this study, the indicators with no significant difference are those issues not directly influential on TQoL, Reliability of bus departure waiting time is lower for Transjogja than regular bus because Transjogja has lower supply of bus availability for each route than demand. So passengers have to wait long time to start their journey in their desire route. In developing countries to achieve a reasonable level of service, the average waiting time should be in the range of 5 to 10 min, with a maximum waiting time of 10 to 20 min under the prevailing condition (Armstrons-Wright & Thiriez, 1987). But when they start their journey, reliability of travel time is almost same for both systems.

In some areas, an interesting result was that the perception of people was not correct. E.g. according to the indicator air pollution, the TQL score of the regular bus is higher than but such a result was unexpected. (Pustral, 2006).

Regular			Transjogja		
Indicator	TQoL Score	Dimension	Indicator	TQoL Score	Dimension
Safety Bus Stop	3.60	Social	Bus Safety	4	Social
Bus Safety	3.39	Social	Safety Bus Stop	3.91	Social
Distance from bus stop to destination	3.36	Personal	Easiness to transfer from one bus to other bus using integrated ticket	3.89	Personal
Reliability of travel time	3.35	Economic	Air pollution	3.85	Environmental
Reliability of bus departure waiting time	3.23	Economic	Noise pollution	3.85	Environmental
Noise pollution	3.07	Environmental	Journey safety	3.63	Social
Distance from origin to bus stop	3.04	Personal	Reliability of travel time	3.62	Economic
Connectivity with other modes like train	2.94	Economic	Information about bus schedule	3.57	Personal
Journey safety	2.94	Social	Accessibility for specific group	3.40	Social
Accessibility for specific group	2.83	Social	Reliability of bus departure waiting time	3.19	Economic
Air pollution	2.75	Environmental	Connectivity with other modes like train	3.18	Economic
Price of the journey	2.64	Economic	Distance from bus stop to destination	3.13	Personal
Information about bus schedule	2.50	Personal	Price of the journey	2.93	Personal
Easiness to transfer from one bus to other bus using integrated ticket	1.33	Economic	Distance from origin to bus stop	2.91	Personal

Table 6-1: TQoL score for the indicators based on performance hierarchy of two bus systems

There can be criticism raised on the analysis taking mean as a TQoL score. But for this study, the ranking pattern can give proper result that can not hamper the score. The measurement of the TQoL is done using subjective data which can provides greater perceptive of passenger experience about public transport. The spider diagram can be a good representation of pictorial as well as analytical.

6.2. Added Value in TQoL

Based on the experience of this study TQoL concept can add values in the different appraisal technique in the following way:

- TQoL technique overcomes the problem of evaluating travel behavior that has been discussed by transport researchers for many years (Goodwin et al., 1990). The reliability issues that usually rise with stated preference can be evaluated with travel behaviour using quality of life techniques.
- It is needed to change the system of considering the potential benefits or costs for the passenger. On others side their wider transport quality of life for all transport projects. Output of CBA in terms of NPV, IRR can only be understand by experts, but the outcome TQoL score in spider diagram can easily be understand by all policy makers and practitioners. Based on the TQoL score, decision maker can invest money to improve in proper direction. This appraisal system can act as coordinated planning and decision-making process that can evaluate both the objective and

subjective benefits of public or private transport. If we include TQoL with CBA in transport planning project, it can formulate the appraisal process more holistic and inclusive.

- SP method has a problem of stated behavior is hypothetical (Feo, et al., 2011) where trip maker may not behave exactly same in future. But TQoL concept does not have problem with the behaviour hypothesis because result of the TQoL is based on the present behavior of the trip maker.
- If we consider TQoL as appraisal technique in the context of Indonesia, there will be an innovation in inclusion of people's perception in decision making. In Indonesia any kind of policy and decision making starts from top level of management and end in the bottom where usually user remains. Using the TQoL concept, the main discussion will start user level, then practitioner and decision makers. In developing country people's participation in the decision making process is not present. But the output score of TQoL technique can be an indirect option of people's participation.
- This research empirically proved the four recommendation of Ben-Akiva and Bonsall (2004) in the following way:
 - i) Relevance: TQoL concept of this research is based on the present behaviour of the passenger of the two public transport systems of Yogyakarta. After studying the present situation of the transport systems, decision making is possible for the future.
 - ii) Interface: Focus group discussion, weighting survey among focus group discussion were used as method where practitioners of transport issues were involved in these methods.
 - iii) Credibility: The output of TQoL in the spider diagram can show the performance of more than one mode at a glance which can be transparent at the same time attractive measure for the decision maker.
 - iv) Dissemination: The pictorial representation of the TQoL score within the spider diagram can easily be communicated to practitioners in non-technical language.

6.3. Comparison of the Application of the TQoL Concept as Applied in this Research with Others Studies

TQoL technique which was formulated by Carse based on the context of European cities of developed country was applied in this study for the assessment of public transport of a developing country. Differences usually remain in different public transport systems, policies among western and eastern part of the world. So some differentiation appeared in the application of the TQoL concept.

Differences in Methodology:

- In building the TQoL concept for two cities of UK, Carse (2011) used two surveys and both surveys were household survey. First was the weighting survey, second was the assessment survey. In Yogyakarta case study, first weighting survey was done among expert group instead of household survey due to time and research budget constraint. The second assessment survey was done based on passengers of the bus systems.
- A big sample size was used in the study of Carse. Only 410 samples were used of this research.
- Carse used 11 scale points for the importance level of each indicator. For the people of Developing country like Indonesia, it was difficult to make them understand the scoring rank from 0-10 within a short time of 10-15 mins, that's way the questions was asked in a way so that they can easily understand and respond correctly.

- Carse used factor analysis to reduce the indicators from the set. But for this study, factor analysis was not used. Because some time results from factor analysis can deduct an indicators based on statistics but in reality the indicator may be necessary to explain the experience of people's perception. Thus reality is a big issue than the result of factor analysis.
- The people from Yogyakarta are not used to with the weight system survey which was done by Carse. Questionnaire with storytelling is much more convenient for them.

Differences in outcome:

The research done by Carse (2011) had demonstrated how a Transport Quality of Life (TQoL) model can appraise passenger travel experience for three different public transport modes i.e LRT, bus, train. The study of Yogyakarta demonstrates the assessment of bus types i.e. Transjogja and regular bus.

Experience of the TQoL study in Yogyakarta:

In developing country, getting people's thoughts from insight is difficult. During the survey, when people were asked about any quality issue of any indicator, in reply they gave very positive answer. But when they were asked in detail why, then answer comes out negative. So using TQoL only based on the score is some time not good.

7. CONCLUSION AND RECOMMENDATION

This chapter concludes the study and gives recommendations. It is composed of two main sections. First, some conclusive remarks from the scope of study are given. Second recommendations are given for further research.

7.1. Study Objective

The research objective of this study was to apply the transport quality of life (TQoL) concept as an appraisal technique for transport assessment in Yogyakarta, Indonesia. This has been done successfully for the appraisal of the two public transport systems in the city of Yogyakarta. TQoL can thus be used as an appraisal technique in transport assessment.

7.1.1. Review Transport Appraisal Technique

In the second chapter (literature review) information about several appraisal techniques that are used in transport planning have been discussed. Among the different techniques, Cost Benefit Analysis (CBA) is clearly the dominant one. Some-times economic valuation, stated preference (SP), stated choice methods, service quality index (SQI) are also being used. From the discussion, it is found that all the techniques are successful in the assessment of public transport, but always for some specific focus. For instance, stated preference techniques particularly focus on travel time savings, while on the other hand CBA puts more emphasis on travel time saving and safety issues (Feo, et al., 2011; Holz-Rau & Scheiner, 2011), However many think that travel time should not be the main factor for appraisal (Metz, 2008). Trip makers' experiences should also be put into the evaluation of current and future transport systems. This is the rationale as to why we deemed it necessary to explore passenger's view-point in developing a new transport appraisal technique. That is why the Transport Quality of life (TQoL) concept is used as a supportive transport appraisal technique in this research.

7.1.2. Define the TQoL concept in Yogyakarta, Indonesia

From the literature review it was found that TQoL has four dimensions, or factors, i.e. economic, social, environmental and personal. Each dimension consists of a set of indicators. For this research the indicators (see table 4-2) were chosen while keeping a proper balance of indicators in the four different dimensions. The flexible feature of the TQoL concept is that indicators can be set easily based on the situation of the area of application. That is why; the chosen indicators for the weighting survey were a mix of three different sources: i) some were adoption from literature, ii) some were adopted from past conducted survey in the study area, and iii) some were newly added considering the socio-economic situation of study area. Results from the weighting in terms of importance level of the indicators, which was conducted among an expert group in Yogyakarta, Indonesia with the help of web-based interviewing software (Survey Monkey) are shown in table 5-1.

The most important indicator was the reliability of travel time, with a score 4.86 (out of 5) (see table: 5-1, while the least important was availability of a women compartment inside the buses with a score of 3.56 out of 5. In Yogyakarta, the majority of the population were women. So it was expected of get a higher

importance on women compartment issue, but it did not happen. That means the results of the survey to finalize the TQoL indicators for Yogyakarta was not biased for one specific group. Another thing which needs to be noted that all of the scores of the indicators were above rank 2, which means that all the selected issues as indicators were important for the TQoL concept of Yogyakarta.

7.1.3. Implementation of TQoL to measure performance of public transport system

Based on results of the weighting survey among by the expert group (see table 5-1) the most important indicators were used to conduct the TQoL survey among the passenger of public transport, and for the public transport system that they prefer during their journey. Based on the indicators, TQoL model for Yogyakarta is presented in figure 5.2. The two systems that are studied, i.e. the Transjogja and regular bus system, differ in several aspects, thus indicators, most notably in terms of possibility of transfer from one bus to another using integrated ticket, bus schedule information and access to bus stop.

In the comparison between Transjogja and regular bus systems based on independent T-test, there are considerable differences in 11 indicators among 14 indicators. But if the regular bus, Transjogja are evaluated separately only with the help of TQoL scope, regular bus is providing better journey experience to its passenger in term of reliability of bus departure waiting time, reliability of travel time, access to bus stop (consists of two parts- i) distance from origin to bus stop, ii) distance from bus stop to destination). On the other hand TQoL score for indicator reliability of bus departure waiting time is 3.19 which is below good level. This is confirmed by others who have recently shown that there was dissatisfaction of passengers on the Transjogja services, particularly waiting time (timeliness and schedule) and travel time of Transjogja ("People Still Complaining about Length of Travel Time of Trans Jogja,"). Only 38% of respondents who felt the bus service in terms of reliability of bus departure waiting time was good, while 54% said moderate, 3% stated very good, 2% percent said poor, remaining 2% stated very poor (source: primary data) . So indicator of TQoL can interpret the real situation of the public transport system.

Based on the comparison of Transjogja and regular public bus drawn in the figure 5-4, Transjogja is getting higher QoL score than regular bus in terms of 10 indicators except distance from origin to bus stop, and distance from bus stop to destination. If we consider only Transjogja, Bus safety is the first highest quality score (4) bus stop safety is getting the second highest score (3.91), air pollution and noise pollution both are the third highest quality score (3.85) and distance from the origin to the bus stop is the last one (2.91). For regular bus, bus safety is also getting first higher score(3.39) like Transjogja and easiness to transfer from one bus to other bus using integrated ticket is getting lower score because people using regular bus does not have the experience of using integrated ticket.

7.1.4. To recommend on improving public transport system

TQoL assessment can play a potential role and important role among the groups of experts and stakeholders involved in future transport appraisal, for example- transport operators, policy makers and practitioners of Yogyakarta. Even the overall design of the public transport system can be initiated from the people's perception it appears. From the primary data, some qualitative notes were found why passengers like regular bus. Regular bus is

- *fast (in terms of reliability),*
- *cheap (journey cost),*
- *near to the destination (access to bus stop)*
- *no transit (transfer from one bus to another using integrated ticket).*

On the other hand passengers like Transjogja because of

- *safety issue*
- *comfortable*
- *less pollution.*

TQoL assessment results found from this research can be applied to different short falls of public transport in Yogyakarta. Authorities can give more priority on those indicators where TQoL scored lower e.g. Transjogja is getting lower score in terms of price of the journey (2.93) (see figure: 5-4).

After talking to the management of Transjogja (Operational and Controlling Division) , Agency of Transportation, Communication, and Information of Yogyakarta Province) it was found that Transjogja was introduced in Yogyakarta to reform the public transport system. Even the Government has the following future plan for the public transport system of Yogyakarta

- Replace all the regular bus with transjogja
- Increase the route of Transjogja
- Expand the transjogja service not only inside the city but also in the neighbourhood areas

The TQoL assessment scores will hopefully be used to further shape of these plans.

Applying TQoL as an appraisal technique in public transport assessment, based focus group discussion and expert survey, the following list of improvement can be proposed:

- Before replacing all the regular bus, the Government should study the TQoL assessment of regular bus system to find out the good and bad quality aspects of that system and consequently consider these points in the removal plan of regular bus. For example, connectivity with other modes like train (2.94), journey safety (2.94), accessibility for specific group (2.83), air pollution (2.75), price of the journey (2.64), information about the bus schedule (2.5) are those indicators which scored below moderate level (moderate level=3) for regular bus. If the authorities put more emphasis on these aspects, passengers of regular bus will be encouraged to use Transjogja.
- If replacement of all regular bus is not possible, the government can rationalise and harmonise the private sector regular bus with Transjogja studying those indicators where significant differences appear between the two systems e.g. reliability of travel time, connectivity with other modes like train, bus safety, safety bus stop, journey safety.
- To increase the route of Transjogja, it is needed to study the Transjogja assessment of each route to find out which indicator is providing good quality of life than others. For example distance from origin to bus stop and distance from bus stop to destination shows a large variation (see figure 5-9). The government can use the TQoL concept to get the information from people's view point, and then easily find out the appropriateness of each route.
- Authority need to show people the advantages of using Transjogja. All these advantages can easily be drawn using TQoL concept can be used in marketing at malls, tourist attractions, universities, schools, offices attracting people to use Transjogja.
- Transjogja is running inside the city of Yogyakarta. It has a large percentage to passengers from neighbourhood area like Sleman, Bantul. Studying the TQoL assessment within the passengers from this neighbourhood, the authorities can focus on the short fall of the services that the passengers from this area are facing.
- The government needs to implement a policy that removes inefficient competition between modes. This policy can reduce reckless driving. Then the quality of life in terms of safe journey will be better and people will love to use public transport.
- To reduce the long travel distance, route network restricting is needed.

- Price of the journey should be reviewed based on travel distance not as fixed as Transjogja system provides. This because the TQoL score is 2.64 for the price indicator which is below moderate level.

7.1.5. Assessing the usefulness of TQoL as a technique of transport appraisal.

This research has demonstrated the use of TQoL technique to identify and evaluate differences in passengers experience on two public transport systems for Yogyakarta. It values the experience on different modes to highlight which one provides the superior QoL and which aspects of provision could be improved to enhance TQoL. It offers a different form of appraisal.

Transport appraisal in terms of cost benefit analysis can explain the financial aspects. But it will fail to cover all the aspects of public transport, particularly passenger's journey quality. For example Sutanto Soehodho (2008) said *"The government will set out guidelines for a comprehensive evaluation process, including external costs and impacts, for deciding the most suitable transport projects. Costs such as pollution and congestion and environmental, social and employment effects need to be considered in a comprehensive evaluation process for a wide range of options."* So the TQoL concept contributes as an essential part in this process.

From the focus group discussion, the Chairman of ORGANDA, the Road Transport Operators Association of Yogyakarta Province discussed that there is no practice in Yogyakarta to involve peoples' participation in making any transport appraisal policy. Unfortunately little research has been conducted in previous studies by the Indonesian authorities based on people's quality of life for transport. Without this, the government and city council officials cannot not truly understand which transport services is beneficial. TQoL is a practical and transparent process which can be used to evaluate a system. Based on the evaluation, the authority can able to find the short comings of the system and decide areas where the Government needs to invest in the future.

To illustrate the implications of TQoL appraisal on policy and practice, the study of Yogyakarta can be used. Yogyakarta transport future now is unclear. News reported by Marwati (2011) on 08/02/2011, stresses some points were explained where TQoL can play a useful role for sake of goodness:

- The presence of 54 buses of TransJogja has not fully met the needs of mass transit service required by the community. The number of the buses is still far below the need, namely 290 buses. To deal with this issue, we can use the TQoL diagram of each route of Transjogja (see figure 5) to see which route giving lower score of average bus departure waiting time than others. For supply of new buses we can consider those routes in future planning.
- Although it has been operational for three years, some of TransJogja buses still suffer losses. Therefore, there will have to be route and connectivity optimization arrangements of airport, railway stations, and shopping centers route. By using the TQoL score, we can easily find out those potential routes which are needed to be considering for future expansion.
- Transjogja started two routes 4A and 4B in operation, due to lacking of passenger numbers. To find out which reason based on people's perception, we can use TQoL concept.

It can be summarize that this way TQoL provides a clearly understood evaluation of public transport experience, something that is lacking in current transport appraisal techniques/ methods. It is not good option always to consider only the potential benefits or costs for the passenger, there need to have a technique that can evaluate wider transport quality of life. This is not fully understood in CBA because the current experience of passengers is not accurately evaluated. The TQoL model provides an alternative appraisal technique that broadens the scope of transport appraisal.

7.2. Future Recommendation

This thesis reflects an initial step for the development of using TQoL technique as appraisal for transport assessment from developed countries' knowledge and to implement this technique in a developing city like Yogyakarta with various constraints of transport development. However further research in this field is required.

Firstly there is an emerging need to analyse existing public transport situation of the study area with large sample data set to have a real detailed picture of the transport situation based on people's perception using TQoL technique.

Secondly for future not only the user of the public transport, also the non users of public transport need to be involved in the survey. To include the non users, the survey question should be reformed in a way so that they can give their opinion and will high light those aspects that will make them use public transport instead of private.

Thirdly detailed study of TQoL can be done among different cities of Indonesia. For example comparing Transjakarta (BRT system of Jakarta city) with Transjogja (BRT system of Yogyakarta) based on people's perception on TQoL. If in both city TQoL give similar score, then one future policy is sufficient for the BRT systems in two different cities. So based on the results future public transport plan policy can be build for the whole country of Indonesia.

Fourthly the implementation of TQoL concept need to evaluated considering in terms socio-economic structure of the society would result in more accurate results.

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8. APPENDIX

Appendix A : Area distribution table of Yogyakarta

Distribution of area among the districts and sub districts of Yogyakarta are given in the following table.

No.	District	Land area (km ²)	Sub-districts	Land area (km ²)
1	Mantrijeron	2.61	Gedongkiwo	0.9
			Suryodiningratan	0.85
			Mantrijeron	0.86
2	Kraton	1.4	Patehan	0.4
			Panembahan	0.66
			Kadipaten	0.34
3	Mergangsan	2.31	Brontokusuman	0.93
			Keparakan	0.53
			Wirogunam	0.85
4	Umbulharjo	8.12	Giwangan	1.26
			Sorosutan	1.68
			Pandean	1.38
			Warungboto	0.83
			Tahunan	0.78
			Muja-muju	1.53
			Semaki	0.66
5	Kotagede	3.07	Prenggan	0.99
			Purbayan	0.83
			Rejowinamgun	1.25
6	Gondokusuman	3,99	Baciro	1.06
			Demangan	0.74
			Klitren	0.68
			kotabaru	0.71
			Terban	0.80
7	Danurejan	1.1	Suryatmajan	0.28
			Tegalpanggung	0.35
			Bausasran	0.47
8	Pakualaman	0.63	Purwokinanti	0.3
			Gunungketur	0.33
9	Gondomanan	1.12	Prawirodirjan	0.67
			Ngupasan	0.45
10	Ngampilan	0.82	Notoprajan	0.37
			Ngampilan	0.45
11	Wirobrajan	1.76	Patangpuluhan	0.44
			Wirobrajon	0.67
			Pakuncen	0.65
12	Gedongtengen	0.96	Pringgokusuman	0.46
			Sosromenduran	0.5

13	Jetis	1.7	Bumijo	0.58
			Gowongan	0.46
			Cokrodiningratan	0.66
14	Tegalrejo	2.91	Tegalrejo	0.82
			Bener	0.57
			Kricak	0.82
			Karangwaru	0.7
	Total area			32.5

A-8-1: Distribution of area among different district and sub-district

Appendix B: Weighting survey questionnaire among focus group

Transport Quality of Life

Dear Sir/Madam

The study I am conducting aims at gaining a better understanding of people's feelings towards public transport. The more transport quality of life indicators are, the better the analysis will be. This survey is arranged to find out the appropriate indicators for evaluating transport quality of life. Here I would like to take the opportunity to thank you for taking the time to complete the survey. Your response is valuable to finalize a set of indicators for transport quality of life in Yogyakarta.

Thank you,

Umme Salma.

1. Transport Quality of Life can be defined in the following four dimensions: economic, social, environmental and personal. Rank the 4 dimensions according to the importance of each dimension in the assessment of Transport Quality of Life by people in Yogyakarta. The most important dimension gets rank 1; the second important gets rank 2, the third important gets rank 3 and the 4th important gets rank 4.

	Rank 1	Rank 2	Rank 3	Rank 4
a) Economic(e.g. employment, travel time, congestion, travel cost, transport infrastructure etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Social(e.g. safety, safe access etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Environmental (e.g. noise pollution, air pollution etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Personal(e.g. availability of seats, price of the journey, bus schedule information etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If the people of Yogyakarta make a choice to use public transport, indicate for each of the following attributes of public transport, how important these attributes are in evaluating the quality of the public transport? (answers range from 'very little importance' to 'great importance'.)

2. Closeness to job opportunities by bus

- a) Closeness to job opportunities by bus 1) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

3. Reliability of travel time (e.g. reach to destination within proper time)

- a) Of very little importance

- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

4. Exclusive infrastructure (e.g. parking facilities near bus stop)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

5. Availability of seats

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

6. Cleanliness

	Of very little importance	Of little importance	It does not matter that much	Of some importance	Of great importance
Bus	<input type="radio"/> Of very little importance	<input type="radio"/> Of little importance	<input type="radio"/> It does not matter that much	<input type="radio"/> Of some importance	<input type="radio"/> Of great importance
Bus stop	<input type="radio"/> Of very little importance	<input type="radio"/> Of little importance	<input type="radio"/> It does not matter that much	<input type="radio"/> Of some importance	<input type="radio"/> Of great importance

7. Distance from the bus stop

	Of very little importance	Of little importance	It does not matter	Of some importance	Of great importance
Distance between origin/home to bus stop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distance between bus stop and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Of very little importance	Of little importance	It does not matter	Of some importance	Of great importance
destination					

8. Price of the journey

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

9. Information about bus schedule

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

10. Accessibility for specific groups (i.e. disabled people, elderly people, women carrying babies)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

11. Easiness to transfer from one bus to other bus using integrated ticket

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of Some importance
- e) Of great importance

12. Bus safety (e.g. safe from pickpockets, baggage safety etc.)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance

- e) Of great importance

13. Journey safety (e.g. trained drivers to avoid accident)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

14. Connectivity with other modes like train

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

15. Noise pollution (e.g. noise inside bus)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

16. Air Pollution (e.g. smoking inside the bus)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of very importance

17. Age of the bus

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance

- e) Of great importance

18. Availability of woman compartment

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

19. Image of the bus (e.g. modern, stylist bus feature)

- a) Of very little importance
- b) Of little importance
- c) It does not matter that much
- d) Of some importance
- e) Of great importance

20. Please list maximum 5 most important elements out of the following list with a small motivation in the adjacent box.

Closeness to job opportunities by bus	<input type="text"/>
Reliability of travel time (e.g. reach to destination in short time)	<input type="text"/>
Exclusive infrastructure	<input type="text"/>
Availability of seats	<input type="text"/>
Cleanliness	<input type="text"/>
Distance from the bus stop	<input type="text"/>
Price of the journey	<input type="text"/>
Information about bus schedule	<input type="text"/>
Accessibility for special groups (i.e. elderly, disabled people, women carrying babies etc.)	<input type="text"/>
Women Compartment	<input type="text"/>

Easiness to transfer from one bus to other bus using integrated ticket	<input type="text"/>
Bus safety (e.g. safe from pickpockets, baggage safety etc.)	<input type="text"/>
Journey safety (e.g. trained drivers to avoid accident)	<input type="text"/>
Connectivity with other modes. e.g. train	<input type="text"/>
Noise pollution	<input type="text"/>
Air Pollution. (i.e. do smoke inside bus)	<input type="text"/>
Availability of women compartment	<input type="text"/>
Quality of bus system	<input type="text"/>
Age of the bus	<input type="text"/>
Image of the bus (e.g. modern, stylist bus feature)	<input type="text"/>

21. Do you miss any indicator/element in the above list that is important in Yogyakarta?

- What is that?
- Why it is important? Please give small explanation

22. Please tell something about your self

Please tell something about yourself Name:	<input type="text"/>
Address:	<input type="text"/>
Gender (Male/Female):	<input type="text"/>
Organization you work for:	<input type="text"/>
Functionality of your Organization:	<input type="text"/>

Prev

Appendix C: Detailed Results from weighting survey

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Distance from the bus stop							
Answer Options	Of very little importance	Of little importance	It does not matter	Of some importance	Of great importance	Rating Average	Response Count
Distance between origin/home to bus stop	0	0	0	7	7	4.50	14
Distance between bus stop and destination	0	0	0	7	7	4.50	14
<i>answered question</i>							14
<i>skipped question</i>							0

Age of the bus			Image of the bus (e.g. modern, stylist bus feature)		
Answer Options	Response Percent	Response Count	Answer Options	Response Percent	Response Count
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<i>answered question</i>			<i>answered question</i>		
14			14		

B-8-2: Results from weighting survey

APPENDIX D: People's perception Survey Questionnaire

To be completed by the interviewer at the start of the interview:
 Did Interview when: after leaving the bus/ before entering the bus

Gender: male/ female	Start of interview time :
Point of departure:	Point of arrival :
Name of the Bus stop:	Bus route no. :
Name of interviewee:	Date:
Address: Sub-village/House no:	Street name:
Post Code:	Sub- district
District:	City

This purpose of the survey is to study the journey experience of individuals using the public bus service in the city of Yogyakarta, Indonesia. The individual perception of citizens about the journey experience is of great value for a research contributing to the improvement of the quality of public transport in Jogja. Your responses to this questionnaire will be treated as confidential. Hence, your honest comments and cooperation will be highly appreciated.

Section A

[* Read I will start this interview asking you some questions related to bus journey experience you already had]

1. For what purpose you are using this bus (present trip)?
- i) Work
 - ii) School/College
 - iii) University
 - iv) Leisure
 - v) Visiting family/ friends
 - vi) Others (please specify).....

Notes:

2. Over all how do you describe the journey quality (please give tick to the relevant answer)
- i) Very poor ii) poor iii) moderate iv) good v) very good

3. How is the reliability of the bus departure/waiting time? (please give tick to the relevant box)
- i) Very poor ii) poor iii) moderate iv) good v) very good
- If very poor/poor/moderate: how much too late (compared to normal waiting time)?.....*

4. How long does your journey normally take you? (circle the number)
- i) <5 mins ii) 5-10 mins iii) 11-20 mins iv) 21-30 mins v) 30+ mins

5. How is reliability of the travel time using this bus system (please give tick to the relevant answer)
- i) Very poor ii) poor iii) moderate iv) good v) very good

If it is very poor/poor/moderate – how much delay (compared to normal travel time)?.....mins

6. How is the connectivity with the train station with the bus route?

- i) Very poor ii) poor iii) moderate iv) good vi) very good

Notes:

7. How is the possibility to transfer from one bus to other using integrated ticket? (please give tick to the relevant answer) (for TransJogja)

- i) Very difficult ii) Difficult iii) Normal iv) Easy vi) Very easy

8. How is safety (in terms of pick pockets, baggage) inside the bus? (please give tick to the relevant answer)

- i) Very poor ii) poor iii) moderate iv) good v) very good

Notes:

9. How is safety (in terms of pick pockets, baggage) inside the bus stop? (please give tick to the relevant answer)

- i) Very poor ii) poor iii) moderate iv) good v) very good

Notes:

10. How is carefulness of the driver (safe driving)? (please give tick to the relevant box)

- i) Very bad ii) bad iii) moderate iv) good v) very good

Notes:

11. How is the provision for accessibility for specific groups (e.g. disabled people, elderly people) inside the bus? (please give tick to the relevant box)

- i) Very poor ii) Bad iii) Moderate iv) Good v) Very Good

Notes:

12. How do you think about the air pollution caused by the bus? (please give tick to the relevant answer)

- i) Very bad ii) bad iii) moderate iv) hardly a problem v) not a problem at all

Notes:

13. How do you think about the noise pollution caused by the bus? (please give tick to the relevant answer)

- i) Very bad ii) bad iii) moderate iv) hardly a problem v) not a problem at all

Notes:

14. How do you consider the information provision about the bus schedule (e.g. timetable, route schedule)? (please give tick to the relevant box)

- i) Very poor ii) bad iii) moderate iv) good v) very good

15. How do you think about the distance from your home to bus stop? (Please give tick to the relevant box)

- i) Very Far ii) Far iii) Normal iv) Near v) Very near

Notes:

16. How many minutes it takes by walk from home to near bus stop? (please check the appropriate field)

- i) 28+ mins ii) 22-28 mins iii) 15-21 mins iv) 8-14mins v) 1-7 mins

17. How do you think about the distance from bus stop to your destination? (Please give tick to the relevant box)

- ii) Very Far ii) Far iii) Normal iv) Near v) Very near

18. How many minutes it takes by walk from bus stop to your destination? (please check the appropriate field)

- ii) 28+ mins ii) 22-28 mins iii) 15-21 mins iv) 8-14mins v) 1-7 mins

19. How much you usually pay for your bus trip?
.....

20. What do you think about the cost of the journey? (Please give tick to the relevant answer)

- i) Very cheap ii) cheap iii) normal iv) expensive v) very expensive

21. How many times do you use public transport each week? (circle answer)

- i) Once per week ii) Two to three times per week iii) Four to five times per week iv) Every day
v) others:

22. Which bus system you prefer to travel, please select and explain why?

If Transjogja? Reasons :

- i)
.....
- ii)
.....
- iii)

If regular bus? Reason:

- i)
.....
- ii)
.....
- iii)
.....

Section B: General information of the respondents

[*Read: Now I am going to ask you some general questions related]

Q.1 Your Age (circle number)

- i) Below 15
- ii) 16-30
- iii) 31-45
- iv) 46-60
- v) Above 60

Q.2 Your education level (circle number)

- i) Not Educated
- ii) Primary education
- iii) Junior High School
- iv) Senior High School/Vocational Education
- v) University degree and above

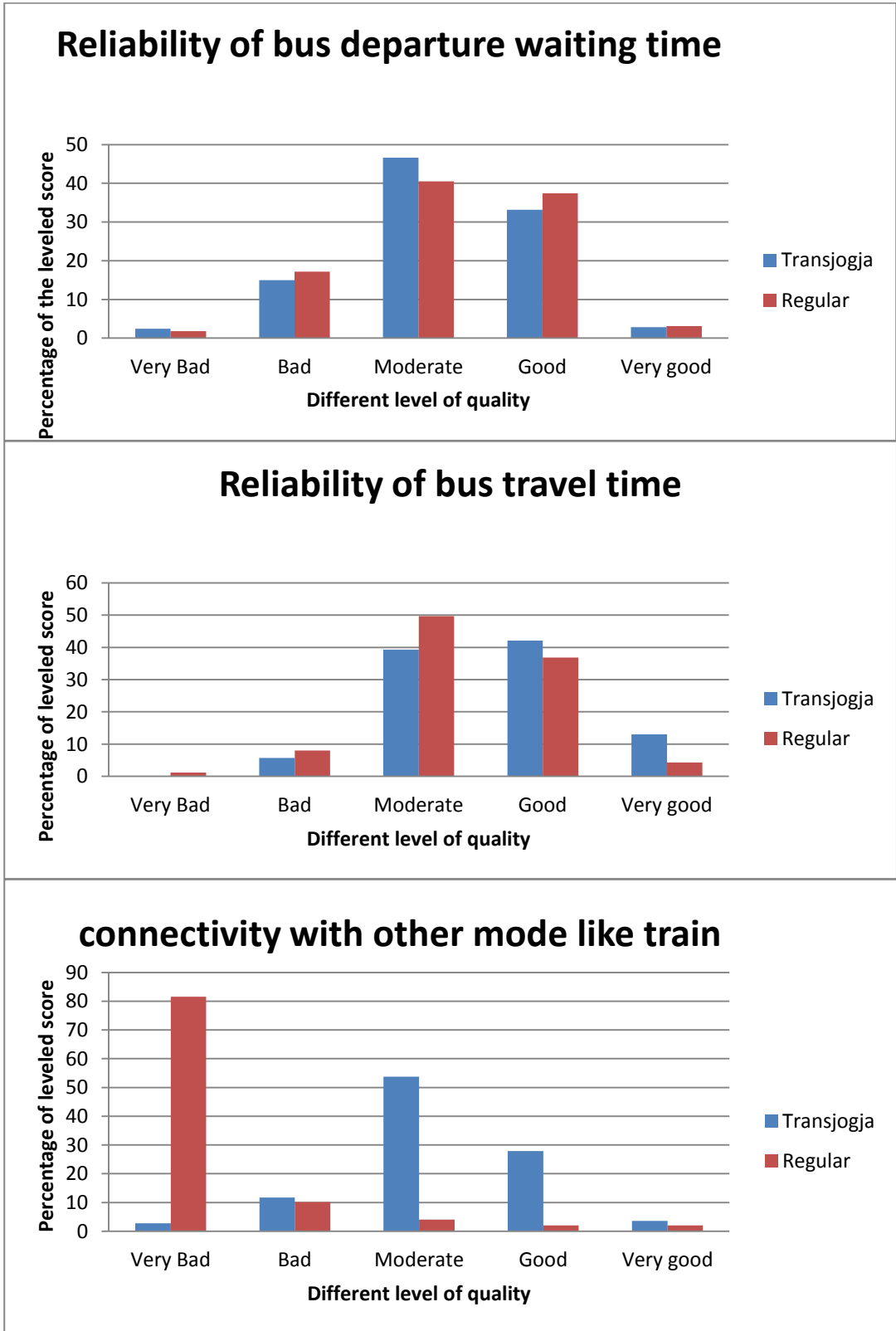
Q.3 Current working Status (circle number)

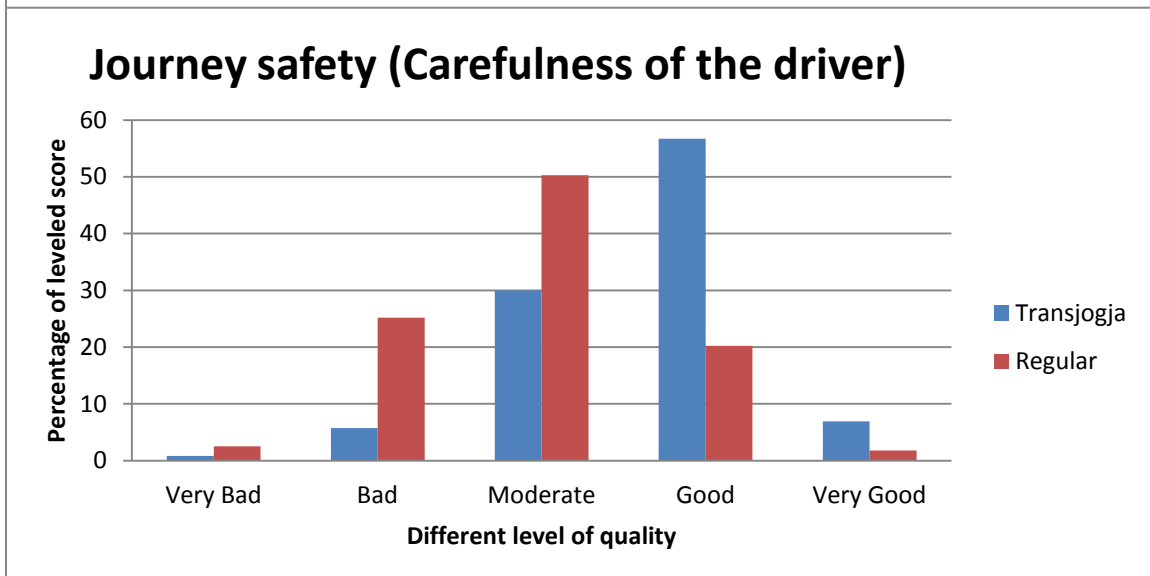
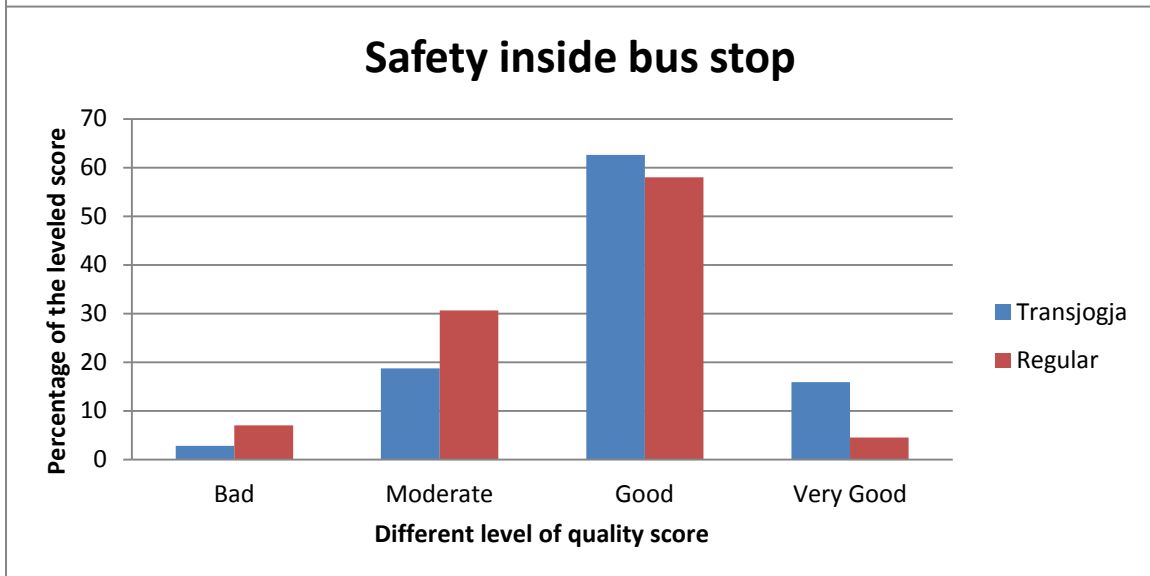
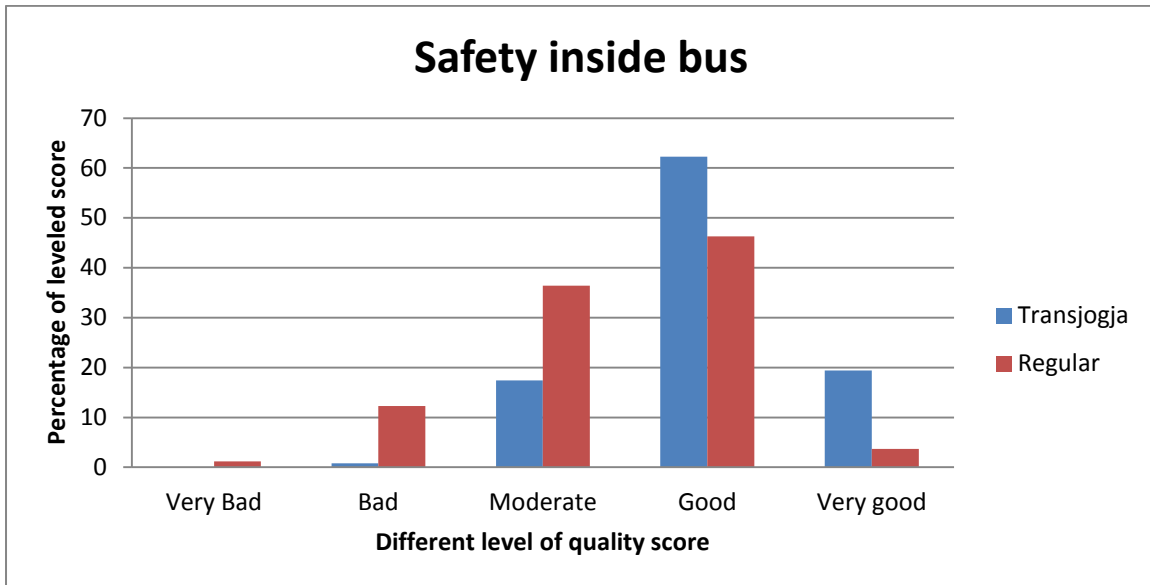
- i) Full time
- ii) Part time
- iii) Retired
- iv) Student
- v) House person
- vi) Unemployed
- vii) Other, please specify.....

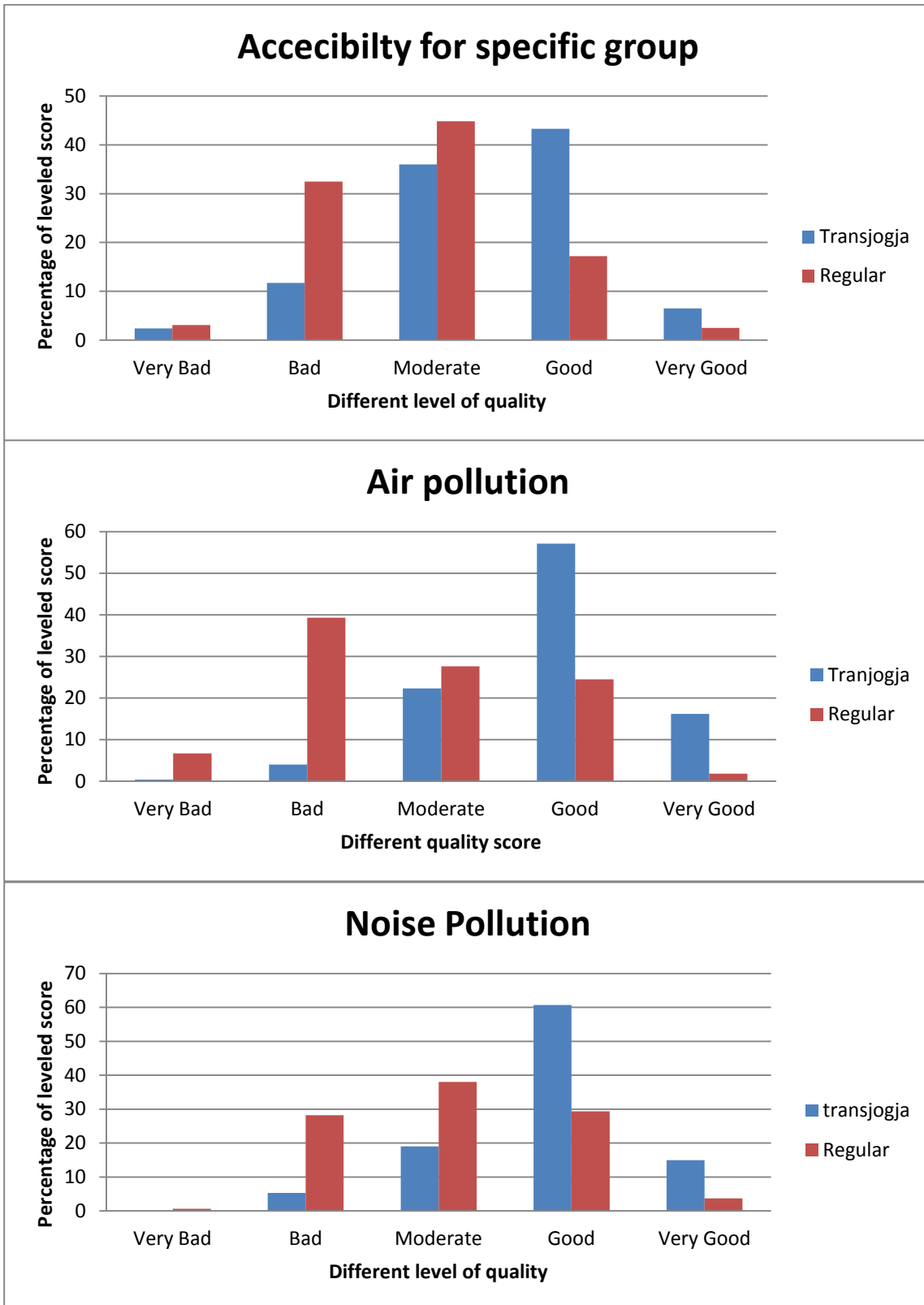
[Thank you very much for your time and cooperation]

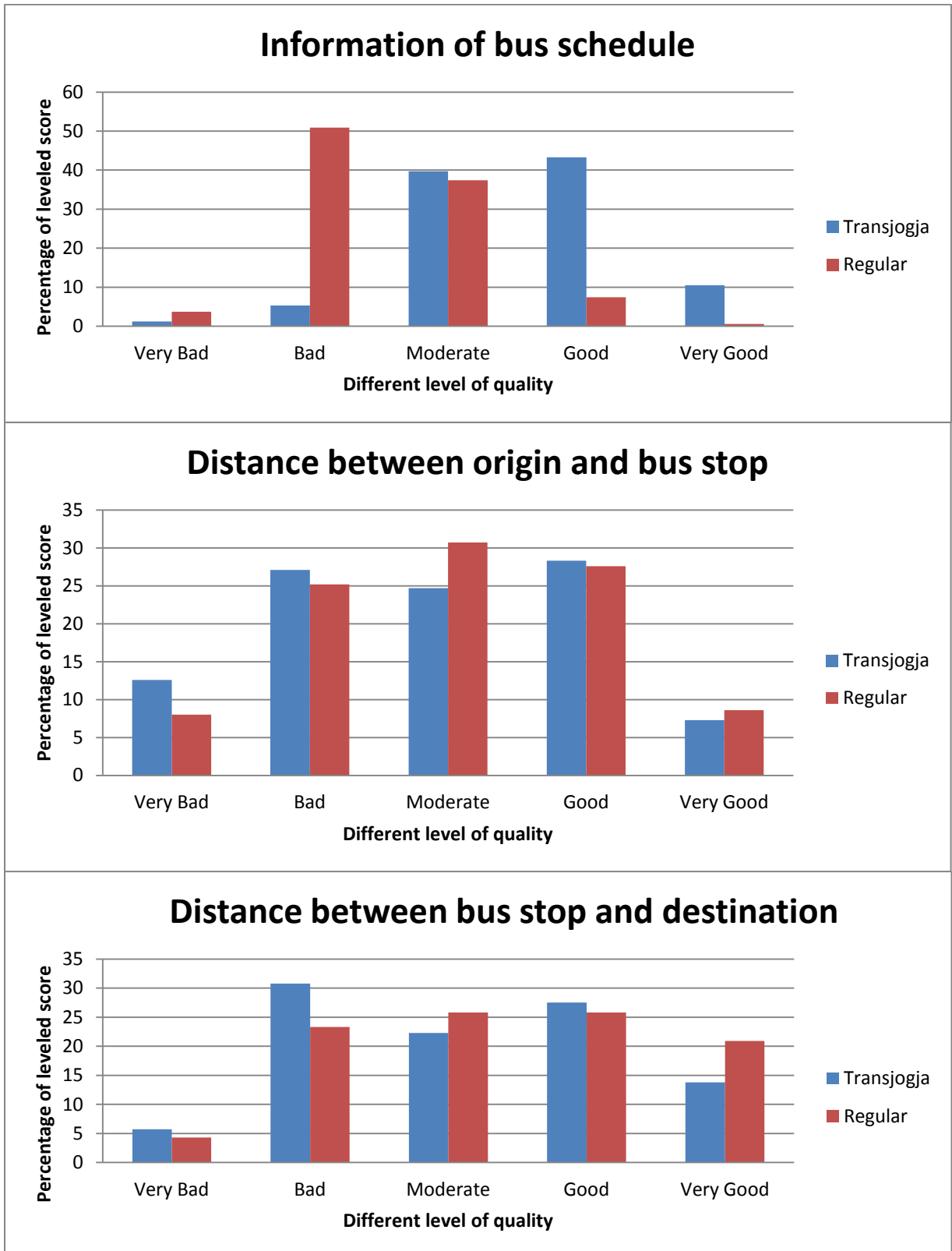
Appendix E: Histogram of Descriptive Statistics of Indicators

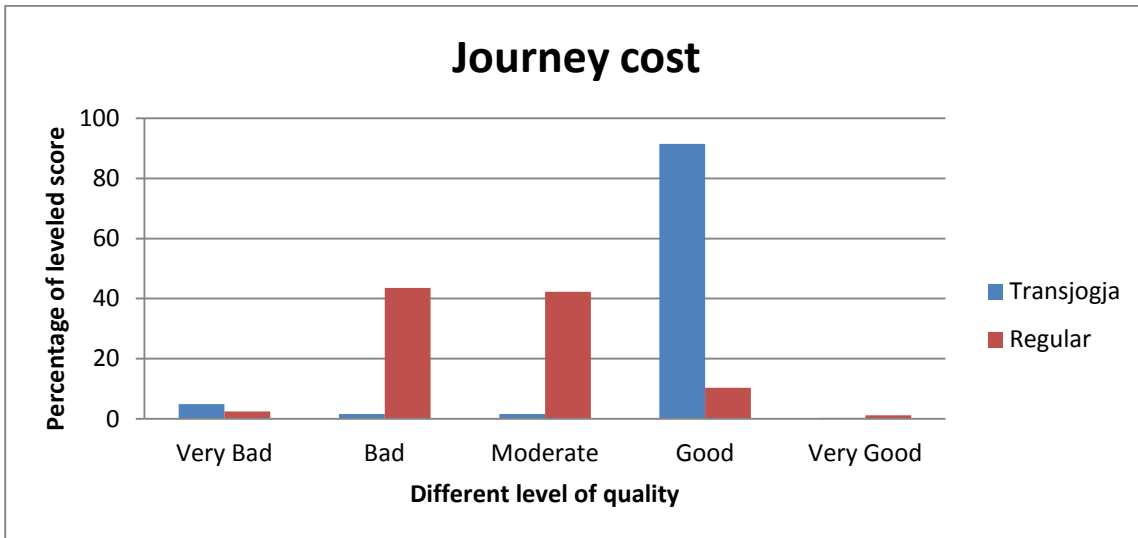
Histogram of descriptive statistics of each indicator are as follows:











E: Histogram of different indicators

Appendix F : T-Test Result

The results of t-test comparing mean TQoL of the public transport system by gender, age characteristics are presented in this appendix.

Indicator List	t-Stat	Sig.(2-tailed)
Reliability of bus departure waiting time	.459	.647
Reliability of travel time	1.917	.056
Connectivity with other modes like train	2.496	.013
Easiness to transfer from one bus to other bus using integrated ticket	.744	.458
Bus Safety	-.094	.925
Safety Bus Stop	.360	.719
Journey safety	.477	.634
Accessibility for specific group	.608	.466
Air pollution	.995	.754
Noise pollution	-.191	.849
Information about bus schedule	2.462	.015
Distance from origin to bus stop	-.131	.896
Distance from bus stop to destination	-1.629	.106
Price of the journey	-2.926	.004

Table F-1: T-tests comparing Transjogja TQoL by gender

Indicator List	t-Stat	Sig.(2-tailed)
Reliability of bus departure waiting time	.124	.902
Reliability of travel time	.812	.418
Connectivity with other modes like train	-.288	.774
Easiness to transfer from one bus to other bus using integrated ticket	-.056	.956
Bus Safety	-.887	.377
Safety Bus Stop	-.490	.625
Journey safety	1.484	.140
Accessibility for specific group	1.893	.060
Air pollution	2.787	.006
Noise pollution	1.224	.223
Information about bus schedule	.392	.696
Distance from origin to bus stop	-1.542	.125
Distance from bus stop to destination	.051	.959
Price of the journey	.339	.735

Table F-2: T-Test comparing regular bus TQoL by gender

Indicator List	t-Stat	Sig.(2-tailed)
Reliability of bus departure waiting time	-1.082	.280
Reliability of travel time	.492	.623
Connectivity with other modes like train	-.491	.624
Easiness to transfer from one bus to other bus using integrated ticket	-3.718	.000
Bus Safety	-2.599	.010
Safety Bus Stop	-2.620	.009
Journey safety	-2.594	.010
Accessibility for specific group	-1.485	.139
Air pollution	-1.829	.069

Noise pollution	-1.553	.122
Information about bus schedule	-1.917	.056
Distance from origin to bus stop	1.408	.160
Distance from bus stop to destination	.789	.431
Price of the journey	.171	.864

Table F-3: T-Tests comparing Transjogja TQoL by age

Indicator List	t-Stat	Sig.(2-tailed)
Reliability of bus departure waiting time	-1.908	.058
Reliability of travel time	-1.258	.210
Connectivity with other modes like train	-.533	.595
Easiness to transfer from one bus to other bus using integrated ticket	-	-
Bus Safety	-.306	.760
Safety Bus Stop	-1.681	.095
Journey safety	-3.781	.000
Accessibility for specific group	-2.4111	.017
Air pollution	-5.942	.000
Noise pollution	-6.024	.000
Information about bus schedule	-1.860	.065
Distance from origin to bus stop	2.778	.006
Distance from bus stop to destination	.848	.398
Price of the journey	-2.004	.047

Table F-4: T-Tests comparing regular bus TQoL by age