

# MEASURING THE DISCREPANCY BETWEEN QOS SUPPLY AND DEMAND IN BUS PUBLIC TRANSPORTATION

MA Thesis  
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# INTRODUCTION

## ■ Research Arena:

- Competition in PT officially began in Israel in 2000
- Approximately 30 regions (Eshkolot) have been licensed
- Objectives of the Reform:
  - Lower operating costs
  - Improve Quality of Service (QOS)

## ■ Research Question:

*Is there a gap between the level of QOS demanded by PT users and that which is supplied through competitive contract regimes; and what is the character and meaning of the gap if it exists?*

# KEY CONCEPTS I

## ■ Privatization in PT

- Important example: Transport Act of 1985 deregulated bus PT in Great Britain with extreme consequences (Preston & Almutairi 2013)

### ■ Potential benefits

- Breaking up monopolies
- Lowered costs
- Increased efficiency

### ■ Potential problems

- Neglect of passengers
- Market failures and lack of competition
- Need for oversight in order to preserve minimum service quality

## ■ Contract Tendering: A popular method for privatizing PT

- Creates responsible competition
- Guarantees a minimum QOS
- Authority retains a measure of control (Merkert & Hensher 2013)

# KEY CONCEPTS II

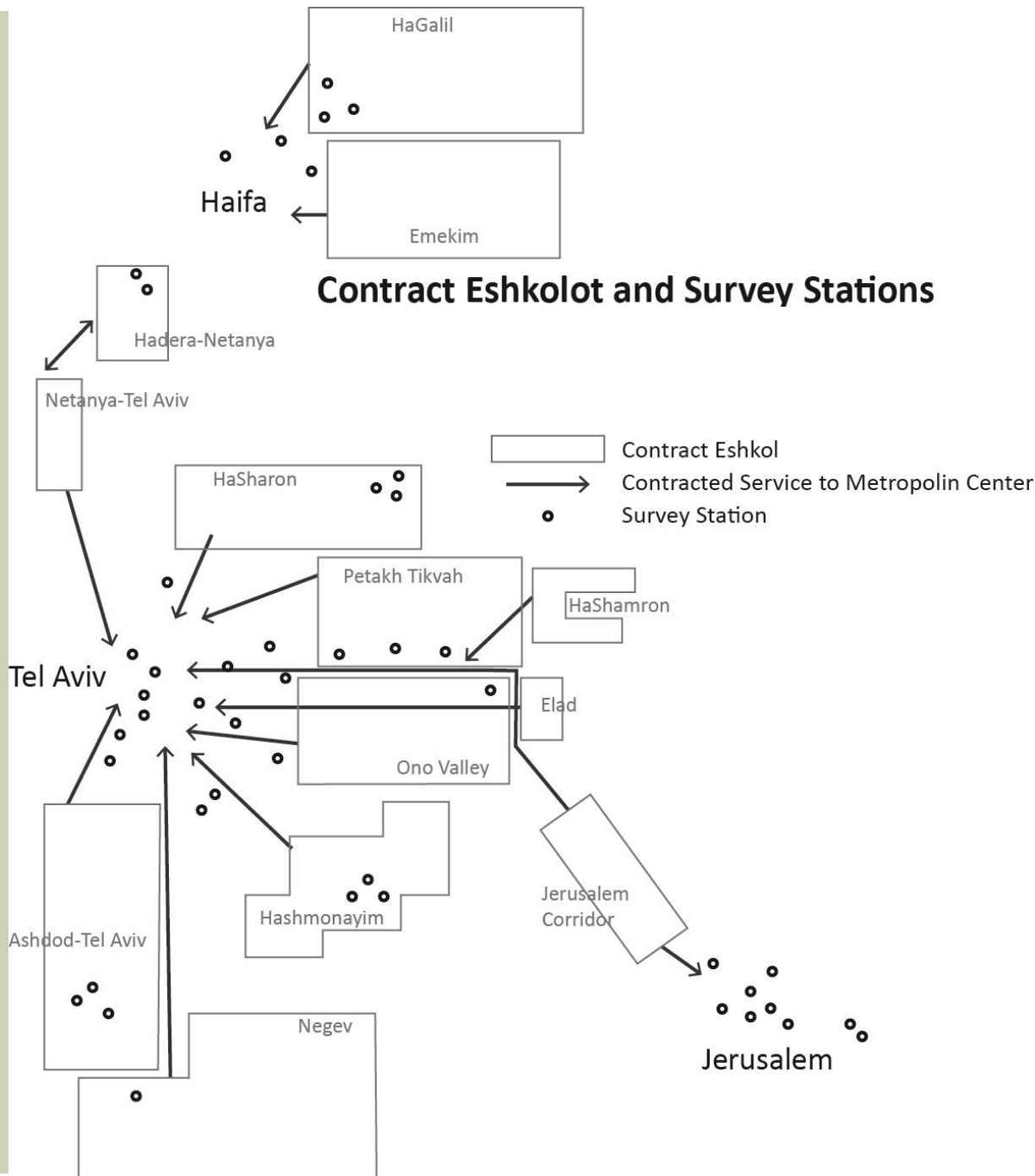
- **Quality of Service (QOS)**
  - QOS is a construct of many factors different per individual (dell'Olio *et al.* 2011)
  - Increasingly utilized by transport authorities and operators to increase ridership (Litman 2008)
  - Often used in conjunction with Customer Service in research (Fischer *et al.* 2014)
  - Often quantified via surveys using measurable/improvable parameters (dell'Olio *et al.* 2011)
  - Potential Correlations:
    - Increase in QOS → increase in PT ridership
    - Increase in QOS → increase in CS

# PT REFORM IN ISRAEL

- Competition is *off-road*
- Operators bid on contracts for service regions
- Contracts are published by the Ministry of Transportation
- Competition for new contracts is fierce
- In general Egged/Dan are excluded from this process
- Certain contract regions are now being offered for the second time

# ABSTRACT MAP OF SERVICE REGIONS, SERVICE EXTENSIONS AND SURVEY STATIONS

Note: while most survey stations are not located within the contract regions, each operator provides service to key locations where a majority of the survey participants were interviewed



## Demand

### *Survey Analysis*

Survey of 615 PT users

Multiple statistical analyses

Univariate, bivariate, regression and component analysis

14 QOS service Parameters

Creation of main QOS demand aspects: satisfaction, importance and ability to improve

### *Method Goals*

To ascertain what QOS parameters are most important and in demand by PT users

## Supply

### *Contract Analysis*

13 relevant contracts

Textual explorative analysis of contracts

- Coding for QOS provision
  - Grouping contracts by characteristics
  - QOS provision quantified per group
- 7 in depth interviews with experts and service providers

### *Method Goals*

To understand QOS provision and character in contract regimes

## Results Comparison

Demand results were compared to QOS provision dictated by contract regimes

Each contract is unique, providing a narrative which explains how supplied QOS is related to what passengers experience and report

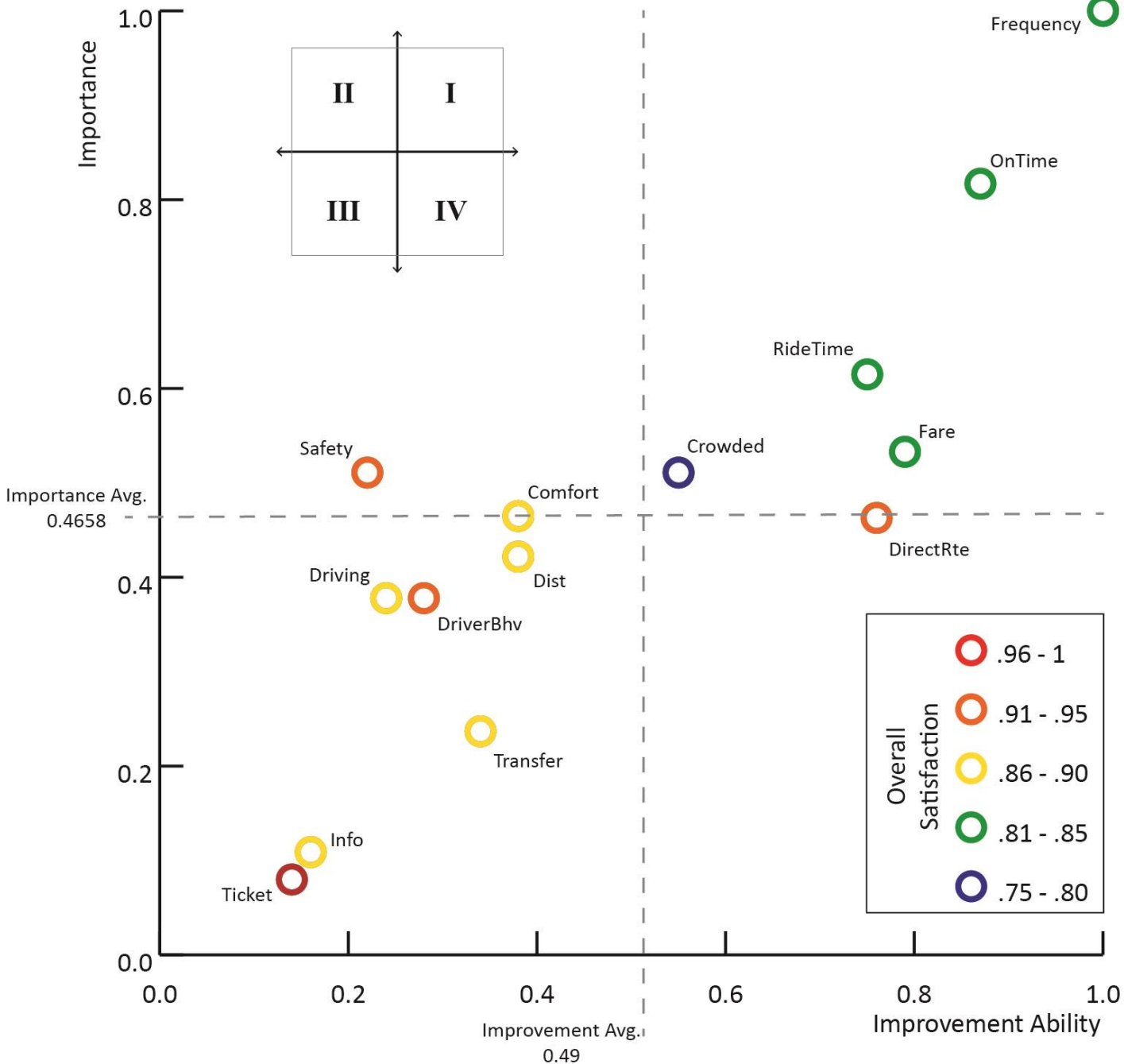
**METHODOLOGY  
FLOW CHART**

Parameter	Group	Definition
Safety	Subjective	Feeling of personal safety at the station and on the bus
Dist	Objective	Walking distance to the bus station
Frequency	Objective	Frequency of bus arrival
Transfer	Subjective	Ease of changing bus routes during a single journey
DriverBhv	Subjective	Politeness and courtesy of the bus driver
Comfort	Subjective	Comfort of sitting and standing on the bus
Fare	Objective	Ride price
Ticket	Objective	Variety of ticket purchasing methods (cash, Rav-Kav, cellular)
RideTime	Objective	Ride time on the route
Driving	Subjective	The driving manners of the driver
DirectRte	Subjective	Suitability of bus route to personal needs
Crowded	Objective	Crowdedness on the bus
OnTime	Objective	Busses arrive on schedule (reliability)
Info	Objective	Signage in bus stations and on the bus (route #/route/frequency)

- Objective parameters – independent of personal opinion and can be verified by multiple independent sources
- Subjective parameters- based on the opinions of people, their perceptions and beliefs

**DEMAND  
RESULTS**  
Table of QOS  
Parameters  
definitions  
and category.

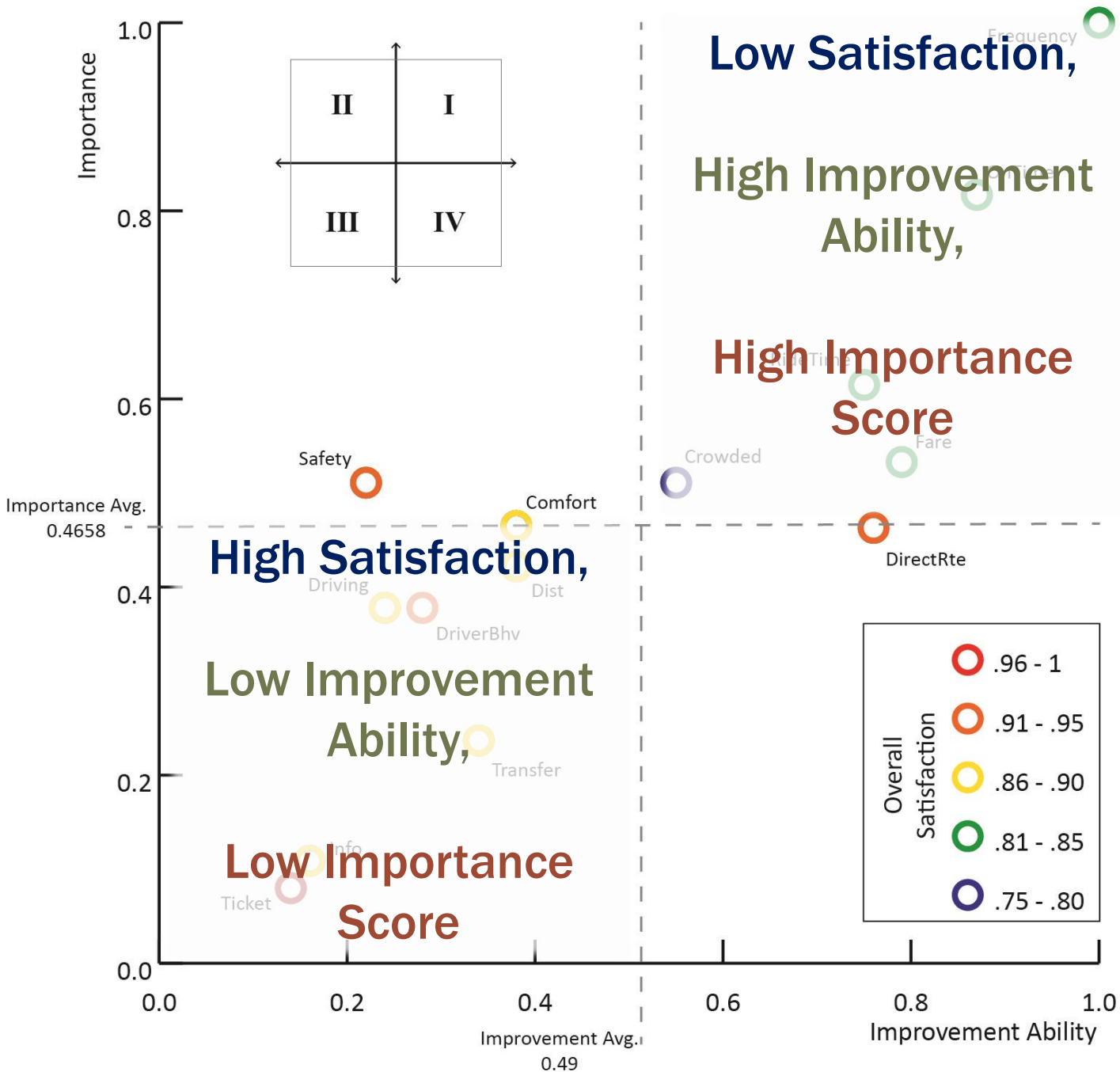
# Importance and Improvement Ability of QOS Parameters by Satisfaction



## DEMAND RESULTS

Scatter plot showing the relationship between the three aspects of PT demand: overall satisfaction, importance, improvement ability

# Importance and Improvement Ability of QOS Parameters by Satisfaction



## DEMAND RESULTS

Scatter plot showing the relationship between the three aspects of PT demand: overall satisfaction, importance, improvement ability

# Graph Conclusions

- Where overall satisfaction is **LOW**, parameters are perceived by passengers as more important and more able to improve their ride
- Where overall satisfaction is **HIGH**, parameters are perceived by passengers as less important with a lower ability to improve their ride
- As satisfaction increases, importance and improvement scores decrease
- Demand is highest for parameters which are perceived as having a lower QOS supply

## DEMAND RESULTS

Scatter plot showing the relationship between the three aspects of PT demand: overall satisfaction, importance, improvement ability

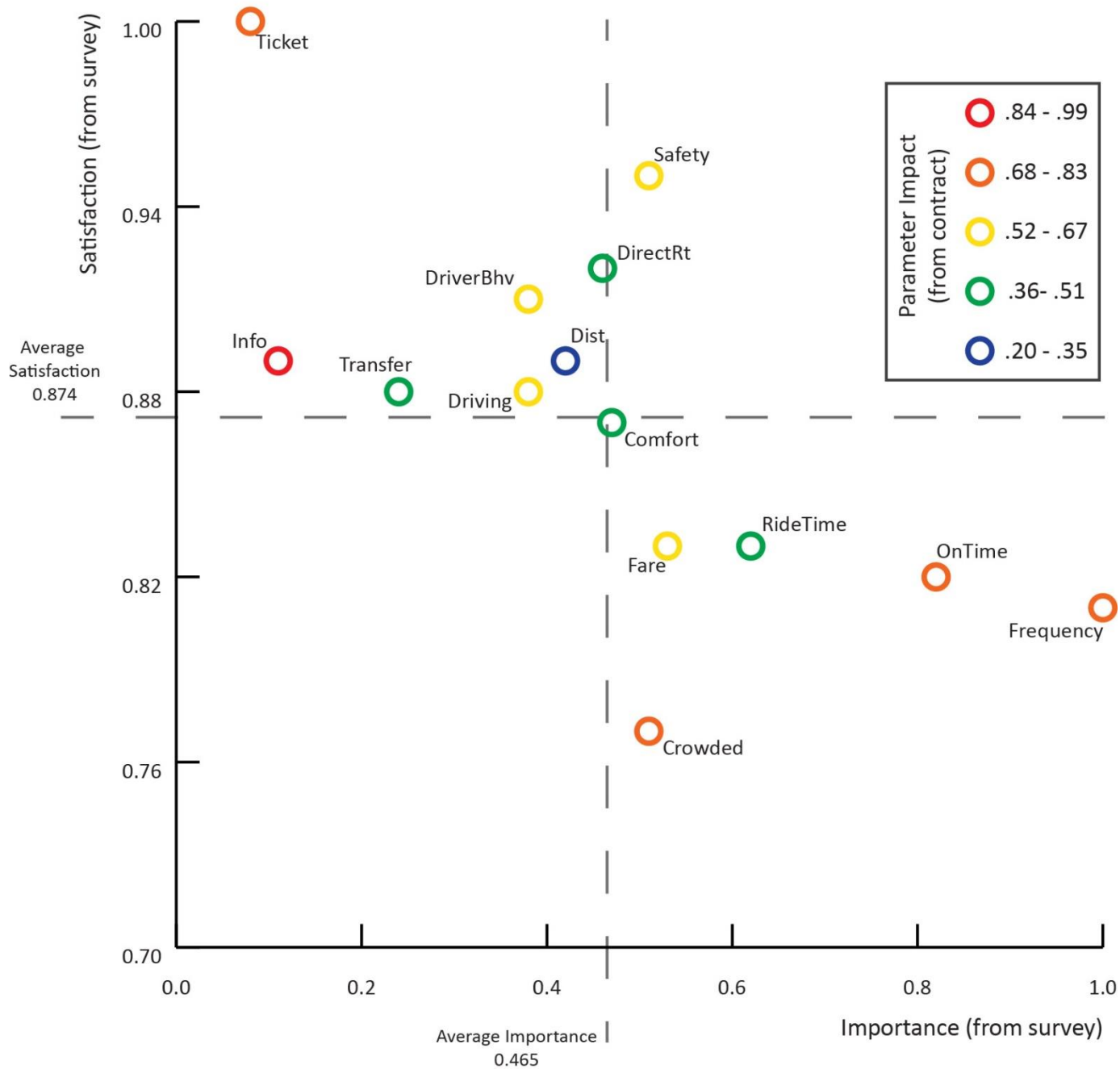
Contract Eshkol	Code	Contract Type	Contract length	Group
1 Ashdod - Tel Aviv	04/2001	Net Cost	6 Years 9 Months	A
2 Ono Valley	36/2001	Net Cost	6 Years 9 Months	A
3 Elad	17/2003	Net Cost	6 Years 8 Months	A
4 Petach Tikvah	17/2004	Net Cost	6 Years 10 Months	B
5 Netanya - Tel Aviv	05/2006	Net Cost	8 Years 8 Months	B
6 Shomron	01/2008	Net Cost	8 Years 9 Months	C
7 HaSharon	15/2008	Net Cost	8 Years 10 Months	C
8 Bnei Brak - Jerusalem	05/2010	Net Cost	8 Years 9 Months	C
9 HaGalil	27/2011	Full Cost	6+3+3	D
10 Hashmonayim	15/2011	Full Cost	6+3+3	D
11 Hadera - Netanya	22/2011	Full Cost	6+3+3	D
12 Negev	26/2011	Full Cost	6+3+3	D
13 Ashdod - Tel Aviv	04/2013	Full Cost	6+3+3	E

- Contract Type: net cost → full cost
- Contract Length: consistent increase
- Contract Group: contracts organized based on their QOS provision

## SUPPLY RESULTS

Participating contracts with group category and selected data

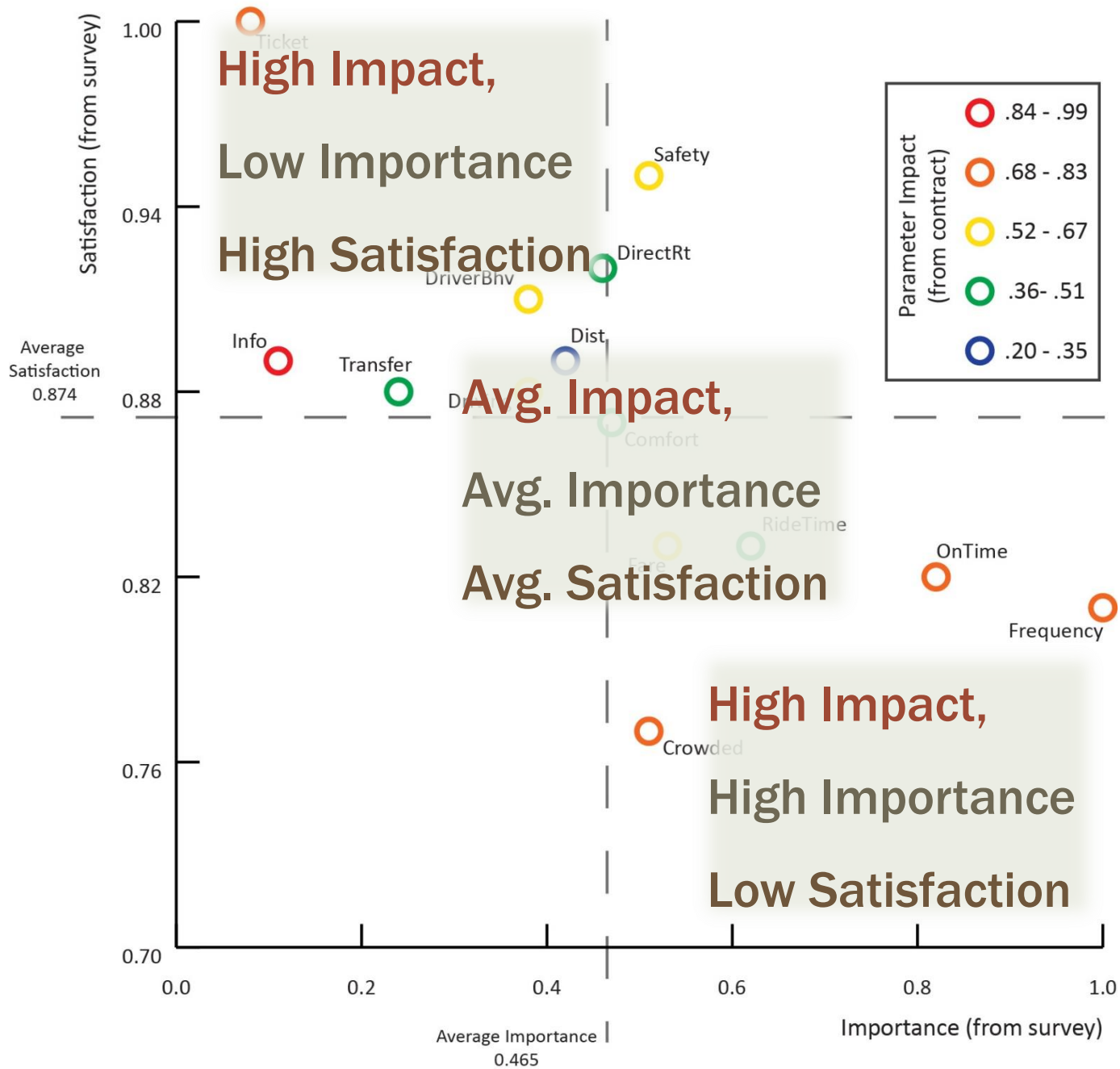
## QOS Parameter Impact by Satisfaction and Importance



## RESULTS COMPARISON

Scatter plot of parameter scores: impact (from contract), importance (from survey) and satisfaction (from survey)

## QOS Parameter Impact by Satisfaction and Importance



## RESULTS COMPARISON

Scatter plot of parameter scores: impact (from contract), importance (from survey) and satisfaction (from survey)

# Graph Conclusions

- Where contract impact is High:

- Satisfaction scores are high and importance scores are low

Or

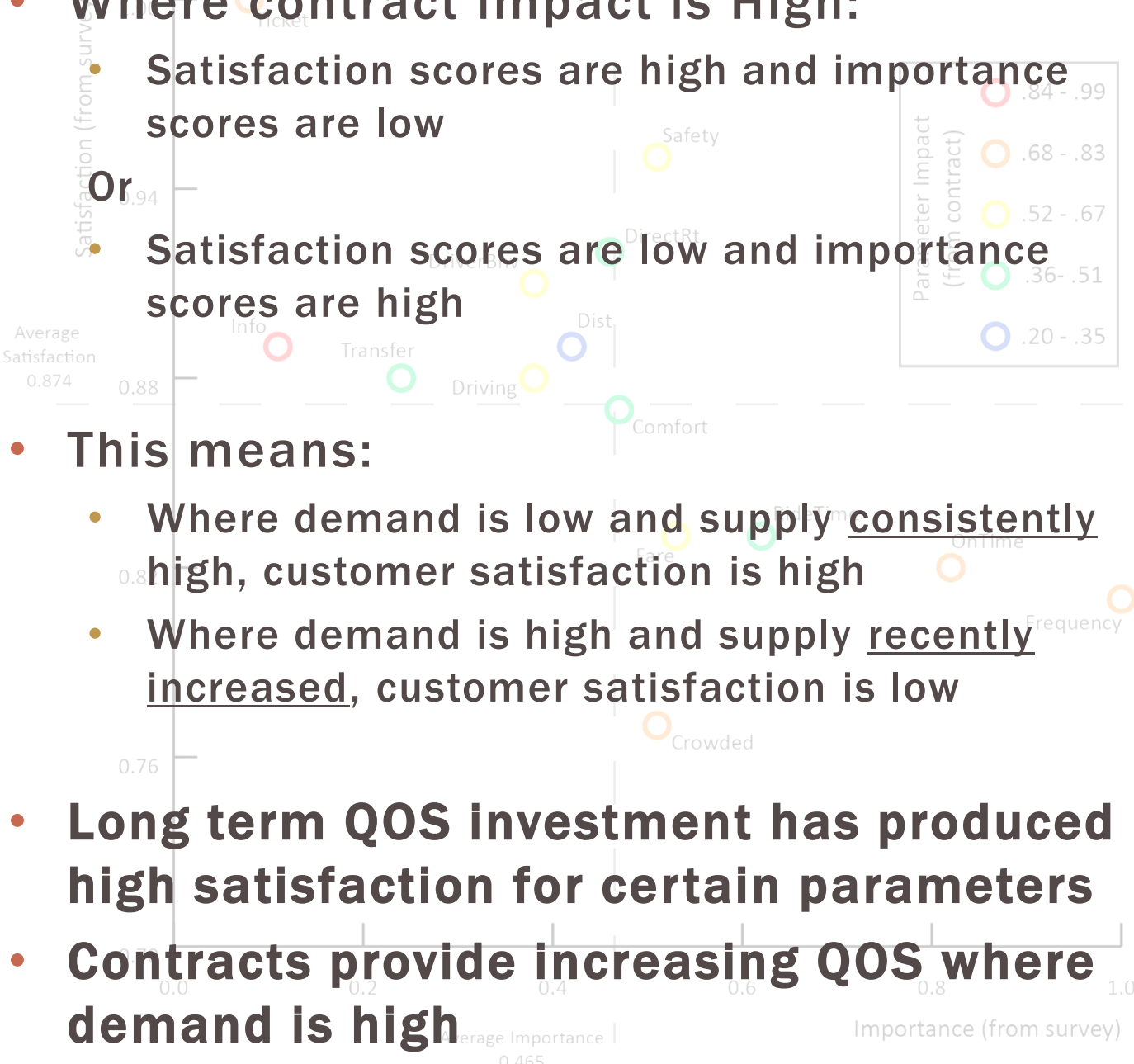
- Satisfaction scores are low and importance scores are high

- This means:

- Where demand is low and supply consistently high, customer satisfaction is high
- Where demand is high and supply recently increased, customer satisfaction is low

- Long term QOS investment has produced high satisfaction for certain parameters

- Contracts provide increasing QOS where demand is high



**RESULTS COMPARISON**

Scatter plot of parameter scores: impact (from contract), importance (from survey) and satisfaction (from survey)

# CONCLUSIONS I

- Objective parameters: RideTime, OnTime, Frequency and Crowding are of high priority for **both** passengers and the contract regime
- For parameters enjoying high priority in all contract groups (Info and Ticket) satisfaction is high; **long term QOS improvement produces results for passengers**
- Parameters important to passengers are given increasing priority with each new contract group

# CONCLUSIONS II

- This research explored the gap between QOS supply and demand in PT and shown it to be small
- It shows that parameters which passengers perceive as most lacking in QOS are also the most in demand
- The authority has placed these parameters highest on the agenda in the contract regime
- This is a trend which should improve QOS in Israel but reduce the incentive for operator enacted QOS initiatives

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