

Real Estate at Schiphol Amsterdam Airport

Creating a program to foster the strategic growth of Schiphol
based on the knowledge economy

P5 Report: Master Thesis
June 2020

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Research Title: Real Estate at Schiphol Amsterdam Airport

Research sub-title: Creating a program to foster the strategic growth of Schiphol based on the knowledge economy

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Abstract

This report focuses on the optimal utilisation of commercial office real estate at Schiphol Amsterdam Airport to further contribute to the Mainport Strategy of the Netherlands. It is important to realise that the non-aeronautical activities play a crucial role for the business of the airport, especially considering factors such as a limit on the number of flight transfers per year and the increasing airport charges, that contribute negatively to the aviation business. This research emphasises focuses on the emergent knowledge economy and how a functional program for office real estate at the airport can further contribute to the knowledge-intensive firms locating there. The literature review forms the base for the research which shows the existing Mainport strategy and Schiphol's role, followed by an insight into the emergent knowledge economy and its potential for the airport location. Next, the empirical part of this research includes understanding the demands of the knowledge corporations at the airport, the strategies used by the office providers, and experts opinions to corroborate the findings from the demand and supply side. Thus, using this triangulation scheme, strategic recommendations are made for an optimal utilisation of the office space to Schiphol Real Estate. This research is highly pertinent not only to the real estate department at Schiphol and other knowledge corporations who are looking to (re)locate in the airport vicinity, and also for other airports around the world to provide appropriate real estate for the commercial office spaces.

Key words: Schiphol Amsterdam Airport, Mainport concept, knowledge economy, office space, Airport City, airport office location.

Preface

This masters graduation thesis, “Real Estate at Schiphol Amsterdam Airport: Creating a program to foster the strategic goal of Schiphol based on the knowledge economy”, has been conducted as part of the graduation lab Real Estate Management (REM) under the Msc. track of Management in the Built Environment (MBE) at TU Delft. I was involved in this research, which began from August 2019, until it was completed in June 2020.

With the growing importance towards the landside developments around transportation hubs, the commercial real estate developments around the Schiphol Airport have always intrigued me, especially with Schiphol being one of the most important airports in the global aviation market. Through this research, I intend to provide a deeper insight into the non-aeronautical activities at the Schiphol Airport and produce certain recommendations for an optimal utilisation of this real estate.

This research has been a continuous learning process, and I would like to thank my supervisors, Philip Koppels and Karel Van den Berghe, for always being available with their immense support and guidance, and critical feedback and valuable insights throughout my research, without whom this would not be possible.

I would also like to extend my appreciation towards all the interviewees for their precious time and inputs, who contributed immensely to this research. Finally, I would like to thank my support system, my family for their love and understanding with their kind words, and my friends for their continuous motivation and encouragement, especially during the most difficult times. Also, thank you Natalia for your constant support and for reading my work and providing feedback on it.

I hope you enjoy reading this thesis!

Shrey Yadav
Delft, June 2020

Table of Contents

Abstract	03
Preface	04
Management Summary	11
I. Introduction	19
01 Introduction	21
02 Research question	23
03 Research method	25
04 Research framework	29
05 Research output	30
II. Literature Review	31
01 Schiphol Amsterdam Airport as the Mainport for the Netherlands	32
02 Airports and the Knowledge Economy	43
III. Empirical Research	55
01 Case study (demand side)	57
02 Semi structured interviews (supply side)	63
03 Semi structured interviews (expert opinion)	64
04 Ethical deliberation	65
05 Knowledge corporations at Schiphol	66
IV. Empirical Results	73
01 Case studies	74
02 Cross-case analysis	89
03 Combined findings: Supply side	93

04	Combined findings: Expert opinion	100
V.	Synthesis	107
01	Aligning findings from Demand, Supply and Expert perspectives	108
02	Comparing empirical findings with literature	112
03	Strategic recommendations	115
VI.	Conclusions	125
01	Answer to research sub-questions	126
02	Answer to main research question	129
VII.	Discussion	131
01	Contribution to existing literature	132
02	Internal validity	133
03	External validity and transferability	133
04	Scope for further research	134
VIII.	Reflection	135
01	Research topic	136
02	Research relevance	136
03	Research process	137
IX.	References	139
X.	Appendices	147

List of Tables and Figures

Tables

Table 1	Research objectives, questions, methodology	26
Table 2	Case study selection criteria and description	58
Table 3	Themes and descriptions for the case studies	60
Table 4	Office buildings in Schiphol CBD	67
Table 5	Office buildings in Schiphol East	67
Table 6	Matrix showing the cross-case analysis, based on the main themes	89
Table 7	Matrix showing the alignment of the demand, supply and expert perspective	108
Table 8	Matrix showing the strategic recommendations in relation to the main aspects of an Airport Office location	122

Figures

Figure 1	Conceptual diagram	24
Figure 2	Research process for the study	27
Figure 3	Research framework for the research	29
Figure 4	Timeline showing the development of Schiphol	23
Figure 5	The five main functions of the Mainport	35
Figure 6	Actor relationship between the various stakeholders involved at the Schiphol Airport	37
Figure 7	The economic effects of Schiphol Airport	38
Figure 8	Economic factors accelerated by the Schiphol Mainport	39
Figure 9	Non-aeronautical activities around an airport	41
Figure 10	The airport city model	42

Figure 11	The three sectors of knowledge economy	44
Figure 12	Main aspects of a knowledge precinct	45
Figure 13	Interaction between different external factors in the knowledge economy at the Airport City	48
Figure 14	The core and periphery model for the property portfolio	51
Figure 15	Theoretical framework: illustrating interaction between the knowledge precincts and the Mainport function	53
Figure 16	The three steps for the empirical research	56
Figure 17	Multiple-case holistic design of case study	57
Figure 18	Case study research design	60
Figure 19	The codes and sub-codes used in ATLAS.ti	62
Figure 20	Overall map of the Schiphol Airport	66
Figure 21	Knowledge corporations in Schiphol CBD	68
Figure 22	Knowledge corporations in Schiphol East	68
Figure 23	Types of APS corporations in Schiphol CBD	69
Figure 24	Types of High-Tech corporations in Schiphol CBD	69
Figure 25	Dutch and international companies in Schiphol CBD	70
Figure 26	Dutch and international companies in Schiphol East	70
Figure 27	Case A findings in the theoretical framework	77
Figure 28	Case B findings in the theoretical framework	81
Figure 29	Case C findings in the theoretical framework	85
Figure 30	Case D findings in the theoretical framework	88
Figure 31	Combined findings from supply side in the theoretical framework	99
Figure 32	Combined findings from experts opinion in the theoretical framework	106
Figure 33	Serviced offices in Schiphol CBD	109
Figure 34	Serviced offices in Schiphol East	109

Figure 35	Interaction between the Mainport function, Knowledge precinct and the Office location at the Schiphol Airport	113
Figure 36	Triangulation technique	115
Figure 37	Financial and spatial flexibility aspects	116
Figure 38	The 3 pillars of the knowledge hubs	117
Figure 39	Creating knowledge hubs in Schiphol CBD	117
Figure 40	The Base, Schiphol CBD	119
Figure 41	The Square 1, Schiphol East	119
Figure 42	The 2-D's strategy- Digitisation and Decarbonisation	120
Figure 43	Methods and results of increased landlord-tenant interaction	121
Figure 44	The main aspects of the Mainport and the Airport City	126
Figure 45	The main aspects of the Knowledge precinct and the external forces interacting at the airport	127
Figure 46	The main aspects at the Schiphol Office Location, based on the findings from the demand, supply and expert sides	128
Figure 47	The strategic recommendations for optimal utilisation of real estate at Schiphol	129

Management Summary

1. Introduction

Airports today are seen as gateways into the city and country, and as key economic generators that highly influence the spatial and real estate developments within their vicinity (Güller and Güller, 2003). They are regarded as dynamic and complex urban environments, wherein local and international corporations locate in the area and take advantage of the competitive environment provided through the network and service infrastructure facilities (Thierstein & Conventz, 2014). This thesis focuses on the commercial office spaces offered at the Schiphol Airport, with the aim of gaining a deeper insight into the landside real estate developments and to propose strategic recommendations for Schiphol to utilise these office spaces in an optimal manner.

This research focuses on two main phenomena. First, the Mainport strategy of the Netherlands, that regards the Schiphol Airport as one of the two Mainports for the country, which contributes to the national economy (European Commission, 2019). With a move towards a logistics revolution, a number of companies decide to locate their head offices and distribution centres at the Mainports (Kuipers & Manshanden, 2010). As Freestone (2009) calls airports “hubs of flow”, the continuous movement of people and cargo through the facility contributes to the initiation and use of the non-aeronautical facilities at the airport and these developments are beneficial for the airports and also enhance the economy of the region, referred to as the Airport City (Kasarda, 2000).

Second, in today’s emergent knowledge economy, corporations are focused on high knowledge and information flow, and prefer to locate in ‘knowledge hubs’ that enables fast and efficient accessibility to their clients and suppliers (Powell & Snellman, 2004). Malecki (2010) describes that the regions in which the companies are located, play a crucial role in determining supply of knowledge and calls this “the local nature of knowledge”, wherein the companies benefit from local knowledge spill overs and geographical proximity to other firms. These areas, concentrating on knowledge intensive activities have been described as knowledge precincts by Yigitcanlar (2010). Airports, especially those with a hub function, facilitate a high flow of transfer and direct passengers through them, present an opportunity to capture the flow of knowledge by providing appropriate landside developments, including office spaces, hotels and other worker amenities and facilities (Conventz & Thierstein, 2015a).

Airport authorities around the world, perceive these landside real estate developments as additional sources of income that helps to diversify and maintain a steady fiscal flow in the case of unforeseen circumstances in the aviation industry (Hirsh & Van der Horst, 2018). Several authors state that the evolving function of airports from just infrastructural facilities to attractive real estate locations consists of a complex interplay of a number of forces, a subject which is yet to be explored in-depth (Appold & Kasarda, 2012; Thierstein & Conventz, 2014). In this context, Conventz and Thierstein (2015b) have highlighted the fact that the airport needs to enhance the attractive locational characteristics, which are currently mainly influenced by the multimodal accessibility feature, for the airports to continue to be an attractive business location for knowledge based corporations.

Problem Statement

With Schiphol as one of the main economic generators for the country, there have been uncertain moments in the aviation sector over the past few years, with the European airports and airlines facing competition from their Middle-Eastern counterparts (Schiphol Group, 2015). This occurrence can be pinned down on two main aspects, Schiphol has reached its capacity of 500,000 flight movements per annum, as an environmental, land and air safety ceiling; and an increase in airport charges for airlines to maintain its overall quality and to accommodate the passengers. These obstacles can have a major effect on the position of Schiphol Airport in and compromise Schiphol’s role as a continental and intercontinental hub airport (Schiphol Group, 2019; European Commission , 2019).

Research goal

The aim of this report is to produce a strategic recommendations for a set of functional programs, in a way that the real estate at Schiphol is utilised optimally for these corporations to locate there and at the same time, understand the vision of Schiphol as a Mainport. This research also aims to fill the knowledge gap, as mentioned by a number of authors who express that over the years airport related spatial developments, which are highly influenced by the emergence of the knowledge economy and the demands of the corporations in the new economy, haven't received much literary attention (Conventz and Thierstein, 2015a; Yigitcanlar et al., 2008).

Research questions

The main research question for this research is as follows

“How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?”

The aim of this research question is to produce a set of recommendations based on the demands of the corporations and the strategies of the office suppliers, for an optimal utilisation of the office real estate assets at Schiphol. The following sub-questions support the main research question.

1. What is the importance of non-aeronautical businesses for Schiphol as a Mainport?
2. How does the knowledge based economy influence the commercial real estate developments around airports?
3. How can the commercial real estate at Schiphol facilitate the knowledge corporations?

The first sub-question helps to understand the significance of the Mainport strategy and the role of Schiphol for it, and to look at the growing importance of non-aeronautical activities for the aviation industry. The second sub-question helps to understand the emergent knowledge economy and how it influences the spatial developments around the airports. And finally, the third sub-question helps to gain a deeper insight into the strategies deployed by the demand and supply side at Schiphol.

2. Research methods

For the purpose of this study, a qualitative empirical research method has been selected; and the research process as shown in figure I, consists of four stages: first, defining the research scope, second, conducting a literature review, third, carrying out an empirical research, and finally drawing conclusions based on the previous steps.

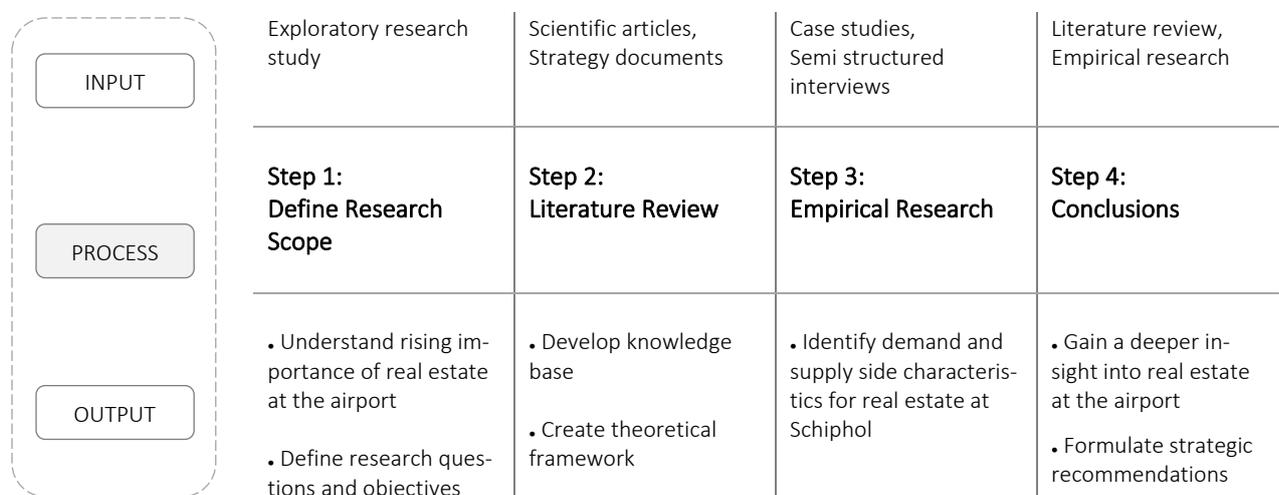


Figure I. Research process for the study (own illustration)

Literature Review

The literature review is approached through a descriptive type of study, in which the primary concepts for the research are analysed through a number of scientific articles, journals, published books and official reports, with the aim of creating a narrative (Bryman, 2016). The literature review helps to understand the two main phenomena, first, the Mainport strategy, the role of Schiphol Airport as an economic generator, and the Airport City with its spatial developments; and second, the emergent knowledge and how numerous knowledge-intensive corporations tend to locate within close spatial proximity, forming knowledge precincts. The main aim of the literature study is to create a theoretical framework to understand the primary concepts in the report. It is important to learn about the information already present about the topic in scientific texts, which also helps to define the themes that need to be further studied through the empirical research methods.

Empirical Research

The empirical research is based on themes and sub-themes identified from the theoretical framework to gain a deeper understanding into the real estate developments in the airport area, and to understand demands and strategies of the various stakeholders involved; this is divided into three sections, demand side, supply side and experts view. Using a variety of sources, and different perspectives helps to create a triangulation technique and have holistic and comprehensive results.

1. Demand side: Case studies

A multiple-case (holistic) design of case study is chosen, wherein different knowledge corporations located at Schiphol are selected as case studies and a cross-case analysis is produced from their findings based on the theoretical framework. The four cases which represent the views of the demand side area:

A. Microsoft Nederland: As one of the largest multinational technology corporations, they have a presence at Schiphol for almost 15 years with their Sales, Services and Marketing office, which is focused on creating a Customer Hub. In the same office building, Microsoft has partnered up with Spaces, a co-working office provider, to create an inspirational work environment (Microsoft, n.d.).

B. Samsung Electronics Benelux: As one of the largest multinational electronics corporations, they decided to relocate their Sales and Marketing part of the organization, from Delft to Schiphol in 2016. Samsung Electronics are a major office occupier in the Schiphol CBD along with Samsung Air Conditioning and DS Smith in the same building (Samsung, n.d.).

C. John Laing Group, WTC: It is a multinational firm, serving a variety of markets from around the globe and with their main HQ in the UK, the company first moved to the Netherlands to work on Dutch PPP projects and have been located at World Trade Centre, Schiphol for over 10 years. (John Laing Group, n.d.).

D. KLM Digital Studio, Tristar 3: As a branch office of the KLM airlines, they work towards digitizing for other employees and started in 2015 in another KLM building. In 2016, as the department grew, they moved to the current location. KLM DS is currently located in Schiphol East, with their operations split between two multi-tenant buildings, Tristar 2 and 3.

2. Supply side: Semi- structured interviews

This part consists of semi-structured interviews with the office suppliers at the Schiphol Airport; three interviewees are selected, the CFO of a co-working provider at Schiphol, a developer and a senior manager at Schiphol Real Estate.

E. Co-working provider: An Amsterdam based office space provider with co-working memberships, dedicated desks, office spaces and meeting rooms; in 2018, they entered into a partnership with another tenant at Schiphol to create an environment focused on digital transformation and data-based solutions (case material).

F. Schiphol Real Estate (SRE): A 100% subsidiary of the Royal Schiphol Group, they are involved in the investment, management and development of commercial real estate properties at the Schiphol Airport. These commercial offices are primarily focused in two areas, the Schiphol CBD and Schiphol East (Schiphol Real Estate, n.d. -a).

3. Expert view: Semi-structured interviews

Semi-structured interviews with experts from practice are conducted to corroborate previous findings and have an unbiased view. Using a variety of sources creates a triangulation which is often used in qualitative data analysis to increase the validity or to gain a different perspective on the topic (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). The following interviewees were selected:

Interviewee H: A senior advisor who works at one of the leading multinational real estate companies and has been involved in a number of office transactions in the Schiphol area, and also surrounding areas such as Hoofddorp and Zuidas.

Max Hirsh: A professor at the University of Hong Kong and the CEO of Urban Experts, Max is the author of Airport Urbanism (AU), which is a pioneering research on the aviation industry and is based on more than 50 airports and works on developing strategies for the airports and the cities that they serve. He is involved in a number of studies and consultancy services and has delivered numerous key note speeches (Hirsh, n.d.).

Pieter Van der Horst: As the M.D. at AIREA Airport City Development, consultants in the field of Airport Cities, landside developments and real estate at the airport and the Cofounder of the Airport City Academy, Pieter is an expert in the field of Airport City developments, non-aviation related revenues, etc. He worked at Schiphol Real Estate for over 10 years, and acted as the Area and Project Director for the real estate developments and their delivery in the Schiphol CBD area.

3. Synthesis

This section confronts the findings from the demand, supply, expert sides at the Schiphol Airport and compare these findings to the theoretical framework developed at the end of the literature review, as seen in figure II.

Location decision and motivation

Corporations from the demand side consider Schiphol as a strategic location which provides accessibility to their customers and clients through the multimodal mode of transport available. At the same time, it is important for the supply side that Schiphol continues to serve its hub function and maintain the quality of the infrastructure provided, thus showing a match between the two sides. Schiphol provides a large number of additional services and amenities, this strategic location also contributes to the learning and playing function of the knowledge precinct as the companies are able to cater to the work-life balance of their employees.

Real Estate aspects

As seen through the demand study, corporations are adopting a more collaborative style of working at the airport, with their customers and partners visiting the office frequently, thus, there is a higher demand of meeting rooms, interaction spaces and employee training centres. Also, the size of the company, along with the high demand for serviced office spaces and the preference for using shared facilities determines their real estate demands. On the other hand, there is an increasing number of serviced office spaces provided by the supply side, but currently there is a paucity of collaborative space solutions, showing a semi-match and a mismatch in the respective aspects. This aligns with the experts' views, in that they lay emphasis on the growing demand and the availability of the serviced and shared office spaces at the airport.

Schiphol in the knowledge economy

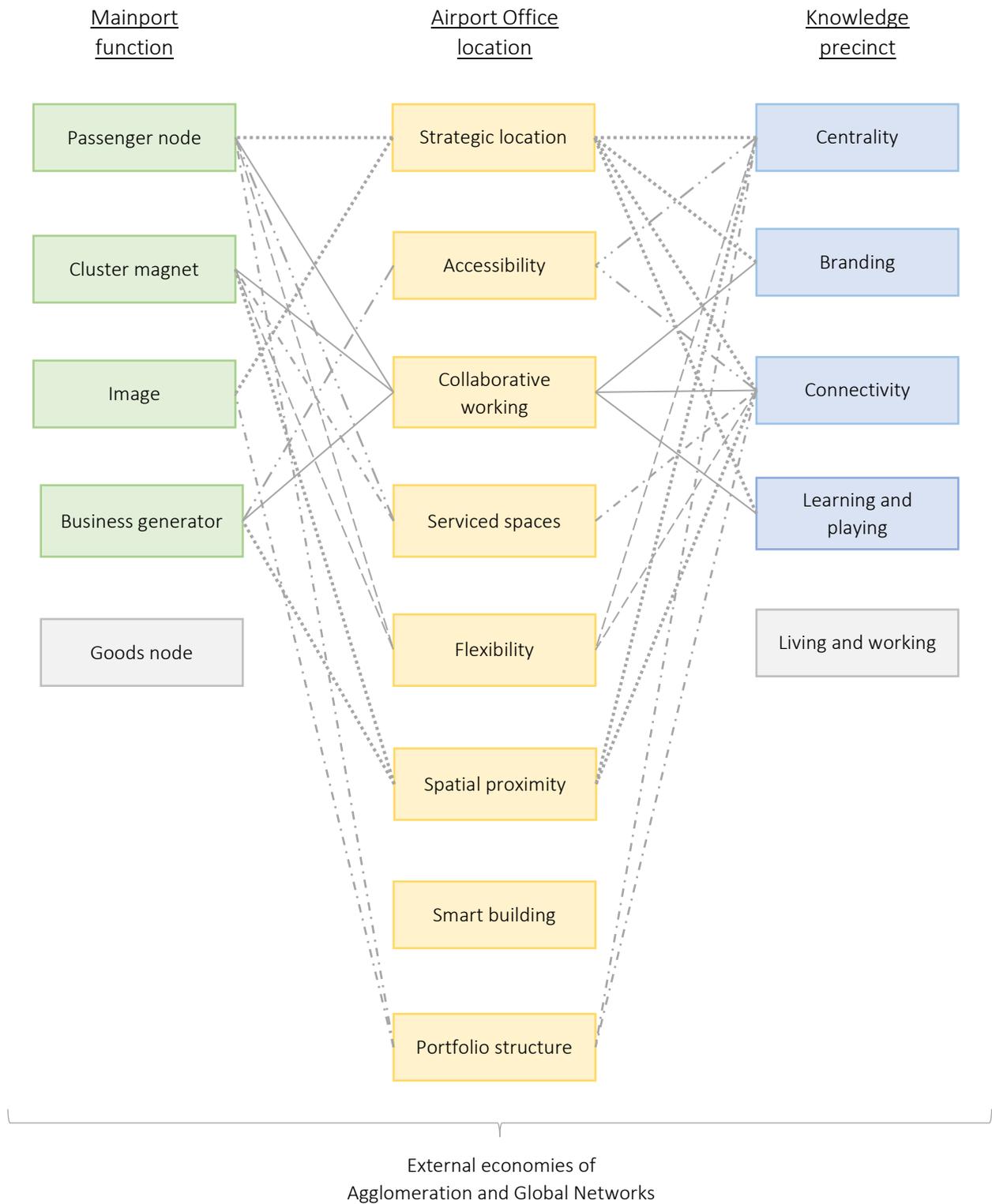


Figure II. Interaction between the Mainport function, Knowledge precinct and the Office location at the Schiphol Airport (own illustration)

Flexibility

With emphasis from all three perspectives, demand, supply and expert, financial and spatial flexibility is seen as a highly attractive option for the corporations, as this helps them respond to some of the uncertainties faced by the company in terms of the duration of the lease agreements and the amount of space required in the future. At the same time, is also seen as a favourable move for the supply side, as it increases the value per sqm of the office space, and helps to attract more tenants and maintain high occupancy rates, even in times of uncertainties and market slumps.

Spatial proximity

Spatial proximity relates to a number of aspects of the Mainport and the knowledge precinct such as cluster magnet, connectivity and centrality. Spatial proximity relates to not only locating in close proximity to one another, but rather, a sense of belonging to a business community and an ease of access to the clients and partners at other business locations. Schiphol Real Estate has implemented a program called the 'Spot Schiphol Community' which is an online and offline platform that brings together numerous companies of varying sizes and expertise to form a part of a single business community, thus showing a match in this aspect.

Smart building

Deploying smart building tools is considered important for both the demand and the supply sides, as it helps the corporations to monitor the use of energy and create a healthy work environment for their employees, and also ensures an optimal utilisation of the available space. Schiphol is deploying initiatives to move towards a Smart Airport City concept, and thus shows a match between the two sides.

Portfolio structure

There is demand for core and peripheral offices at the airport, with the companies using it as a cost saving measure or as an added convenience for its employees; the same office space has a different functional use for different employees serving either the Dutch market or the international market. The connectivity and centrality offered at the location enables this distinction for employees to use the space differently. Although the office suppliers cater to the core and peripheral office requirements, currently, there is no specific focus on this aspect, and especially in relation to the functional use of the buildings, which shows a mismatch.

Additional aspects

There are certain additional aspects for the knowledge corporations, such as increased relational proximity and talent attraction, as a result of the passenger node and connectivity offered, and the urban vibe created at the Schiphol Airport.

4. Conclusions

The following research questions are answered in the conclusions of this study.

Q1: "What is the importance of non-aeronautical businesses for Schiphol as a Mainport?"

Over the years, the Mainports evolved from being transport nodes, to generators of economic activities, and had five well-defined functions, namely, goods node, passenger node, cluster magnet, business generator and an international reputation and image (Priemus, 2001). As the role of Schiphol changed from being an engine to a facilitator, Bleumink et al. (2006) defined the economic sectors that Schiphol contributes towards: world trade, tourism, global labour productivity and the creative industry.

The importance of non-aeronautical activities at the airports are characterised by a continuous movement of people and cargo and include various sectors such as retail, industrial parks, business parks, research and education institutes and distribution centres, with these spatial developments called the Airport City (Kasarda, 2004).

Q2: “How does the knowledge based economy influence the commercial real estate developments around airports?”

With the emergence of the knowledge economy and globalisation, corporations tend to locate in close proximity to one another in vibrant and well-connected urban locations, known as ‘knowledge precincts’ (Florida, 2015). With the five main functions of the knowledge precincts, living and working, centrality, branding, learning and playing and connectivity, as defined by Yigitcanlar et al. (2008), numerous authors advocate that the airport location functions as a knowledge precinct, with its multimodal transport hub function that connects a number of national and international business locations (Button et al., 1999; Dvir & Pasher, 2004).

Within the Airport City, two external forces interact with each other that influences the strategies and demands of corporations locating at the airport, firstly, firstly at the meso level are the agglomeration economies, and secondly, at the macro level are the global network economies (Conventz & Thierstein, 2015a; Lüthi et al., 2012).

Q3: “How can the commercial real estate at Schiphol facilitate the knowledge corporations?”

The existing infrastructure facilities at Schiphol, which provide national and international accessibility to other business locations and helps the corporations draw on an enormous employment pool, are some of the main reasons corporations locate there. The real estate demands of the companies depend on several factors such as the size of the company, the working styles and the maturity levels and also influence the demand for shared amenities and serviced office spaces. The lease prices, quality of office spaces and how client-facing the companies are, affect the preference for Schiphol CBD or Schiphol East, which form the two sub-markets in the area.

Corporations have their core or peripheral offices at the airport, and use different portfolio options for a variety of reasons, these offices serve different functions for different employees, depending on the local or international market they serve. Financial and spatial flexibility options, combined with smart building tools show immense potential to satisfy the needs of the corporations and optimise the space available at the airport. Spatial proximity in terms of ease of access to different business locations and a business community at Schiphol is also considered important for the knowledge corporations at Schiphol.

Main Q: “How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?”

A set of strategic recommendations are produced for the office space at the Schiphol Airport to be utilised in an optimal manner.

- Move towards Flexibility: Financial flexibility in terms of the lease contracts and exit options and spatial flexibility in terms of the amount of space offered, caters to the demands of the corporations and also increases the value per sqm of the existing buildings. Having a different flexibility approach in Schiphol CBD and East can help maintain the occupancy rates in the areas.
- Create Knowledge Hubs: This brings together research, education and business, and helps to initiate innovation and contribute back to the knowledge economy, wherein all three parties mutually benefit from one another under one roof.
- SQUARE 1: Developing this facility in Schiphol East helps to create a new identity for the area, wherein this new multi-tenant building can act like an anchor building for the area and be focused on young companies and start-ups, and thus can act as an incubation centre for businesses by providing the appropriate real estate facilities.
- Digitization and decarbonisation: This helps the non-aeronautical business at the airport to reduce the carbon footprint and ensures the optimal utilisation of the available space.
- Landlord- tenant interaction: To maintain and further improve the relationship between different parties, a continuous and proactive approach can be taken by using regular POE’s, monthly meetings and employee surveys.

5. Discussion

This research contributes to the exiting literature and brings together a number of topics: the Schiphol Airport as the Mainport strategy of the Netherlands, the emergent knowledge economy, and the real estate and locational demands of corporations at the Airport City. With the airports being regarded as the fifth wave of human settlement around the transport hubs, after seaport, rivers, railways and highways (Kasarda, 2004), this research focused on the locational and real estate requirements at the Airport City.

As the concept of Airport Cities is growing around the world, certain characteristics from this study can be replicated and transferred to other locations. Also, the scope of this research covers the knowledge corporations at the Schiphol Airport, and the findings from the cases can be applied to other companies located or planning to locate at the Airport City.

At the same time, this research and its corresponding theoretical framework was constructed primarily around the Schiphol Airport City, hence it is important to realise that the steps and efforts put in place by the airport authorities at Schiphol are substantial and have not been replicated at other Airport Cities to the same extent and Schiphol has reached a certain level of maturity in relation to the concept of an Airport City. There are certain other factors, such as the size of the country, the availability of land, and financial aspects, among other factors, that are specific to Schiphol and make the research context-bound to a certain extent.

Further research can be focused on relating these findings to the aviation demands of the corporations in a quantitative manner and how this influences the real estate at the airport. Also, exploring sectors other than the knowledge economy, based on the theoretical framework developed at the end of this research, can help gain a wider perspective on the Airport City. This research can be taken to different countries, to see how the theoretical framework is affected individually in each of them, and thus, creating a cross-country analysis of the framework can help gain an international perspective on the topic.

I. Introduction

01 Introduction

Airports around the world have emerged from being sources of transportation with massive infrastructure facilities, to complex and dynamic urban environments with a variety of stakeholders involved. According to Güller and Güller (2003), airports today are seen as a gateway to the city and the country, while being regarded as key economic generators influencing greatly the infrastructure and real estate developments around them. Authorities realise the pivotal role that the airport plays in today's economy, with more corporations looking to locate in the vicinity and take advantage of the competitive environment provided through the network and service infrastructure at the airport (Thierstein & Conventz, 2014). Thus, it becomes important to realise the true potential that landside real estate developments have for the airport and how these assets can further contribute to the total development of the organisation.

This thesis is approached from the real estate management field of study, wherein the relevant stakeholders are identified, while analysing their organizational and spatial strategies and demands in the new knowledge economy. Having a deeper understanding of the present day airports and the commercial office spaces they offer in the real estate market, helps to develop an accommodation strategy, for the portfolio and possibly at the building level, to meet the demands of the corporations locating there, while contributing to the organisational strategy of the airport.

In today's dynamic economic environment, fast-paced business activities and quick communication are key needs for corporations, who are looking for a high knowledge and information flow. One of the fundamental demands of these corporations is spatial proximity, i.e., locating within 'knowledge hubs', which enables fast and efficient accessibility to their clients and suppliers (Powell & Snellman, 2004). Many international airports in Europe offer two incorporated spatial functions, airside accessibility to a number of international destinations and an integrated transportation network providing access to the landside, which attracts a large number of corporations to locate in their vicinity and take advantage of these infrastructure facilities (Conventz & Thierstein, 2015a). Airport authorities have become aware of the central role that they play in the knowledge economy and it is imperative that they use this to their advantage and towards a further optimal utilisation of the available spaces.

Airports around the world are trying to reduce their dependence on funding through only aviation based activities, while generating revenues through other sources, i.e., non-aeronautical businesses, which helps them to maintain airport charges to the minimum and attract more airlines and passengers (Arup, 2016). Airports have become the driving force in the poly-centralisation of the metropolitan area, i.e., creating multiple environments that stimulate a diverse use of land through developments, while promoting different levels of economic impact within the area surrounding the airport, and in the city they are located in (Knippenberger, 2015).

The Dutch central government in 1985, along with other national ministries, identified Schiphol Amsterdam Airport (along with the port of Rotterdam) as one of the two 'Mainports', which primarily contribute to the national economy of the Netherlands (European Commission, 2019). According to Schiphol Group Strategy 2016-2020, Schiphol Amsterdam Airport (SAA from now on) aims to be Europe's most preferred airport; "cannot be Europe's biggest airport, but want to be the best." (Schiphol Group, 2015)

Problem statement

The Mainport strategy for the Netherlands, which was drawn up in the late 1980's, pinned down Schiphol as one of the main economic generators of the country by promoting the transfer of high volumes of cargo and number of passengers (Kuipers & Manshanden, 2010). But, there have been uncertain moments in the aviation sector over the past few years, with the European airports and airlines facing competition from their Middle-Eastern counterparts (Schiphol Group, 2015). As per Interim Results by Royal Schiphol Group (2019), SAA has maintained its current rank of being the "second-best connected airport" in Europe, but has dropped in ranking to third as a transfer airport with the best connectivity around the world. This occurrence can be pinned down on two main aspects, Schiphol has reached its capacity of 500,000 flight movements per annum, which is mainly imposed as an environmental ceiling, as well as a land and air safety measure; and an increase in airport charges for airlines to maintain its overall quality and to accommodate the growing number of passengers, imposed as of 1st April 2019. These airport charges are expected to increase at 7.9% per annum for at least the next three years. The upper limit on the number of flights can have a major effect on the position of SAA in the international market, at the same time compromise Schiphol's role as a continental and intercontinental hub airport (Schiphol Group, 2019; European Commission, 2019).

Two main phenomena can be seen developing parallel to one another, on one hand, a number of authors (Conventz & Thierstein, 2015a; Lüthi, Thierstein, & Bentlage, 2012; Priemus, 2001; Yigitcanlar, Velibeyoglu, & Martinez-Fernandez, 2008) describe airports as powerful economic engines, that have considerable spatial and economic impacts on the area they are located. While on the other hand, knowledge has increasingly been recognised as the fourth factor of production in the new economy, with high importance given to the generation and sharing of knowledge between corporations (Hirschhorn, 1984; Powell and Snellman, 2004). Airports, especially those with a hub function, that facilitate a high flow of transfer and direct passengers through them, present an opportunity to capture the flow of knowledge by providing appropriate landside developments, including office spaces, hotels and other worker amenities and facilities. This paper focuses on the office developments at Schiphol Amsterdam Airport, and their optimal utilisation to contribute to the knowledge economy.

Along these lines, this report aims to understand the potential that Schiphol offers for the knowledge-intensive corporations and how the flow of people and information can be captured through the real estate facilities. On one hand, the development of the Airport City at Schiphol contributes to a number of factors such as agglomeration economies, geographical proximity to other firms, and the connections to international business locations, while on the other hand, real estate facilities such as the type of office spaces, contract types and additional services and worker amenities play an important role in further developing Schiphol into an attractive business location.

Annual reports published by the Schiphol Group have shown the increasing importance and revenues generated from the real estate over the years, with occupancy rates increasing from 85.2% in 2011, to 90.8% in 2019, and certain fluctuations in the numbers over the years (Schiphol Group, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019), as compared to the occupancy rates of 96.5% in Amsterdam South-Axis, which shows an extraordinarily high demand of office spaces in the area (Savills, 2019). With the developments towards a knowledge economy and restrictions imposed on SAA, it becomes important to realise that Schiphol's ability and capacity to build up and maintain a competitive environment for corporations, greatly influences the continued growth of Schiphol Group and the success of Schiphol as a business location, further contributing to the Mainport strategy of the Netherlands.

Societal relevance

Research on the concept of airport cities, and reports published about the Schiphol Airport have shown that commercial office spaces form a major part of the landside development contributing to the non-aeronautical activities at the airport. At Schiphol, the real estate assets generated over 87 million € in the first half of 2019. This contributes to around 15% of the total revenue of the airport, with majority of these revenues coming through office buildings (Schiphol Group, 2019). At the same time, there is a rise in the knowledge-intensive corporations over the last few years, who seek high speed generation and exchange of knowledge to stay ahead of their competitors (Powell & Snellman, 2004). A combination of these factors, presents an opportunity to create a new approach towards the Mainport strategy of the Netherlands, especially in relation to Schiphol. Thus, it becomes crucial for the office real estate around the airport to be utilised in an optimal manner, while contributing to the knowledge firms and ultimately towards the Mainport strategy of the Netherlands.

Scientific relevance

Since the early 2000's there has been an increasing amount of literature produced, and interest taken in the way airports around the world have grown and how they have influenced spatial developments around them (Free-stone & Baker, 2011; Huijs, 2011; Kasarda, 2019; Schaafsma, 2003; Thierstein & Conventz, 2014; Van Wijk, Brattinga, & Bontje, 2011). The role of airports has now changed from being just a transportation service provider with suitable infrastructure for the aviation industry, to being one of the most important drivers for the real estate market and as a stimulator encouraging knowledge spill overs and information layovers in the new knowledge economy (Conventz & Thierstein, 2015a). These studies show a complex relationship between the various businesses that co-exist at an airport location, and the need for an in-depth understanding into the interaction and contribution of knowledge corporations, from the point of view of real estate. Conventz and Thierstein (2015a) and Yigitcanlar et al., (2008) express that over the years airport related spatial developments, which are highly influenced by the emergence of the knowledge economy and the demands of the corporations in the new economy, haven't received much literary attention, especially in the field of urban planning and real estate development.

To understand how the real estate at Schiphol can further contribute to its growth, two main factors need to be focused on, the demands of the knowledge corporations that locate at the airport to benefit from the location and the flow of people through it, and the strategies deployed by the office suppliers at the airport to best capture the flow of the knowledge workers. Thus, inputs from the corporations and office providers, and understanding their individual point of views helps to show the potential opportunities for Schiphol as a business location. This forms the basis to formulate recommendations to create a strategy / action plan for Schiphol Amsterdam Airport to enhance their commercial office portfolio, thus, adding further value and fostering the growth of the airport. Hence, the following research question needs to be answered:

“How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?”

02 Research Questions

How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?

The aim of this research question is to produce a set of recommendations based on the demands of the corporations and the strategies of the office suppliers, that leads to an optimal utilisation of the office real estate assets at Schiphol. Based on these, Schiphol is able to address the changes in the emergent knowledge economy and further contribute to the Mainport strategy of the Netherlands. Strategic growth focuses on the long term growth of the organization, by tapping into underutilised markets, i.e., the non-aeronautical sector, and by building upon the existing core business of aviation, thus, contributing to the overall development of the organization. The following sub-questions support the main research question.

1. What is the importance of non-aeronautical businesses for Schiphol as a Mainport?

This research question focuses on two important topics that form the basis of the research. First, on the role of the Schiphol Airport as a Mainport for the Netherlands. Second, the definition of non-aeronautical businesses in general, why they develop around the airport, and their growing importance for the airport and the region they are in. A theoretical approach is taken to answer this question by studying the literature available on the topic.

2. How does the knowledge based economy influence the commercial real estate developments around airports?

This question focuses on the spatial developments around the airport which are influenced by the rising knowledge economy, also referred to as 'knowledge precincts' by Yigitcanlar, et al. (2008), wherein significant importance is given to the movement of people and high-valued goods. To understand this phenomenon through the lens of real estate, the following sections provide an in-depth review on the topic of: globalisation and the emergence of the knowledge industry; the development of knowledge precincts; and the role of the airport in this new economy, which is influenced by agglomeration economies at the meso scale and global network economies at the macro scale.

3. How can the commercial real estate at Schiphol facilitate the knowledge corporations?

This question addresses two main parts of this research. The first part, which is the empirical part, aims to understand the demands of the knowledge corporations located at the Schiphol Airport and the strategies deployed by the office providers to cater to the demands. In the second part, a strategy/ action plan is formulated for Schiphol, which is based on the literature review and the empirical findings. The aim of this question is to help the airport better accommodate the knowledge corporations, which in turn, further contributes to the Mainport strategy of the country.

Answering the above mentioned questions formulates recommendations that help Schiphol provide a future-proof business location to cater to the knowledge-economy. It becomes important to view the Mainport strategy from a different perspective, as the current strategy is built up on concepts that face challenges for the aviation industry, this presents an opportunity for the non-aeronautical sector to contribute to the overall economy of the country. The main concepts addressed in the research and the relationship between them have been shown in Figure 1.

Conceptual Framework

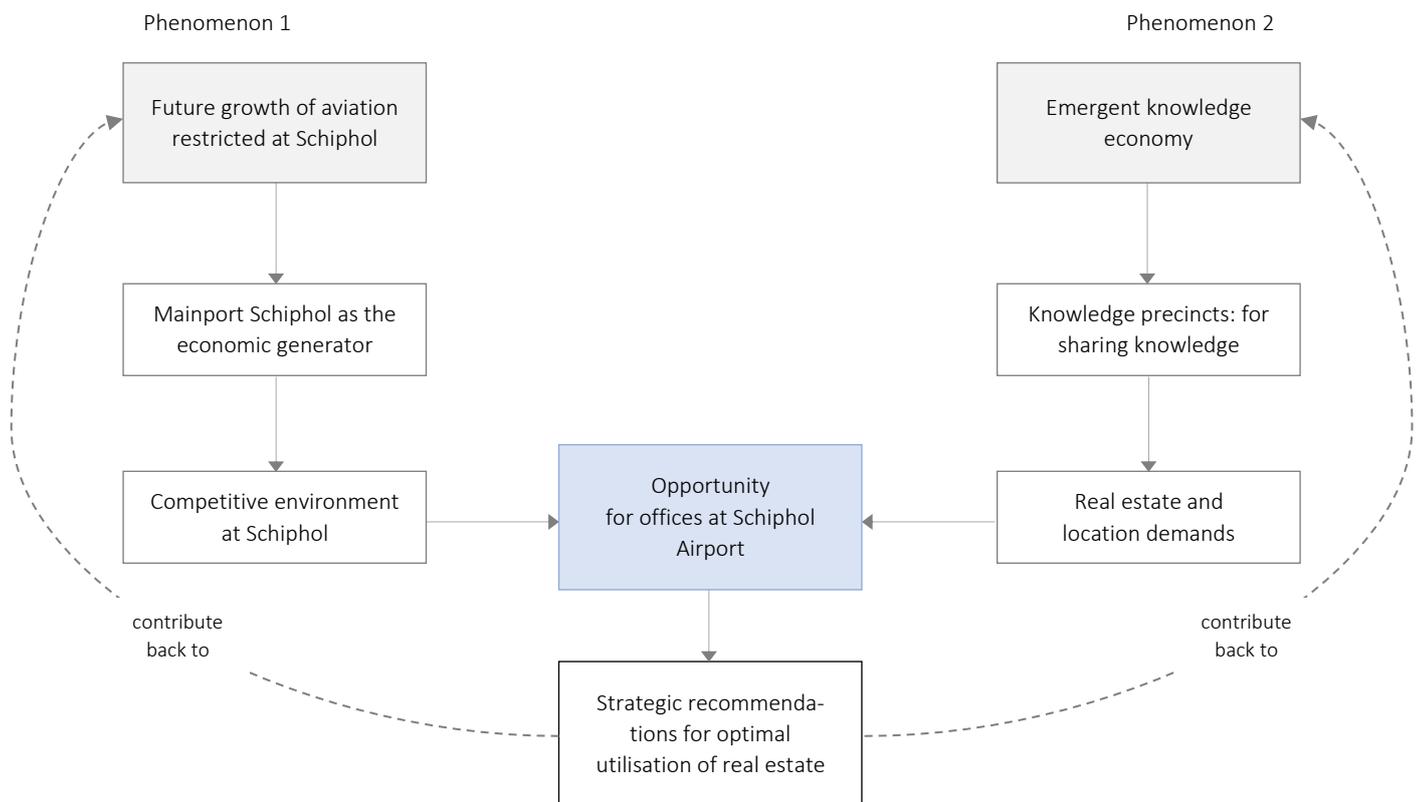


Figure 1. Conceptual diagram showing the variables involved in the research (own illustration).

03 Research Method

This section of the paper focuses on the research methodology used to achieve the main aim of the study and answer the main research question, to have a holistic understanding of the process and a well-defined outcome. This section is divided into four main parts, first, is the epistemological commitment which justifies the approach that is taken for this research. Second, an overview of the research methods is provided, which shows the particular research approaches taken to answer each of the sub-questions. Third, the research techniques which are used in the study are elucidated in detail, starting from the literature review, which is used to build up the theoretical framework, the case studies and then the semi-structured interviews. Finally, this section ends by shedding some light on the ethical deliberation considered for this research.

3.1 Epistemological commitment

For the purpose of this study, a qualitative research method has been selected. In order to pin down the approach that the research follows, it is important to identify the preferred epistemological commitment, which runs through the course of the research and influences every step of the process. For this research, a positivistic philosophical underpinning as advocated by Yin (2013) has been selected as an approach that focuses on three primary aspects: objectivity, validity and generalizability.

According to Yin (2013), in the positivistic approach, designing a theoretical framework is given high importance as it forms the basis of the research and helps to define a suitable approach, and the aspects of data that need to be collected and analysed. The cases selected for this type of research are approached with the idea of explaining further the concepts identified in the theory. The theoretical framework, has also been related to the concept of analytic generalisation, wherein the findings from the case study are either used to corroborate, modify, reject or advance the theoretical notions or, add new findings to the scientific data (Yin, 2013). This approach is found to be suitable for this research, as the final aim of the paper is to produce a strategic plan such that the real estate at Schiphol can contribute to the knowledge corporations, while building up on the literature of the Airport City.

3.2 Research methods overview

This section states the different research methods which have been used to answer the research questions. This is shown in a tabular form (in Table 1), by first stating the research questions, followed by their respective research objectives and finally the methods proposed. The main research question is as stated below:

“How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?”

No.	Research question	Research objective	Literature review	Case study	Semi-structured interviews
1	What is the importance of non-aeronautical businesses for Schiphol as a Mainport?	To understand significance of the Mainport strategy and the role of Schiphol for it. Also, to look at growing importance of non-aeronautical activities for the aviation industry.	✓		
2	How does the knowledge based economy influence the commercial real estate developments around airports?	To understand the emergent knowledge economy and how it influences the spatial developments around the airports.	✓		
3	How can the commercial real estate at Schiphol facilitate the knowledge corporations?	To understand the strategies deployed by the demand and supply side at Schiphol, to understand the future plans of the Schiphol real estate department. And ultimately, to propose strategic recommendations for an optimal utilization of the real estate based on the findings.		✓	✓

Table 1. Research objectives, questions and methodology (own table)

At the same time, it is also important to have a well-defined research process for this study, as stated by Yin (2013), who emphasises on creating a logical plan that helps the researcher to get from the initial set of defined research questions, to a set of answers for these questions. There are a number of steps between these two points, which include collection of relevant data and its analysis. The research process for this master thesis has been shown in figure 2, this depicts the four different stages of the research, which start with defining the research scope, followed by building up the literature review, gathering information through case studies and semi-structured interviews for the empirical research, and finally conclusions focused on designing a strategy/ action plan for the real estate to be utilised in an optimal manner at the Schiphol Airport.

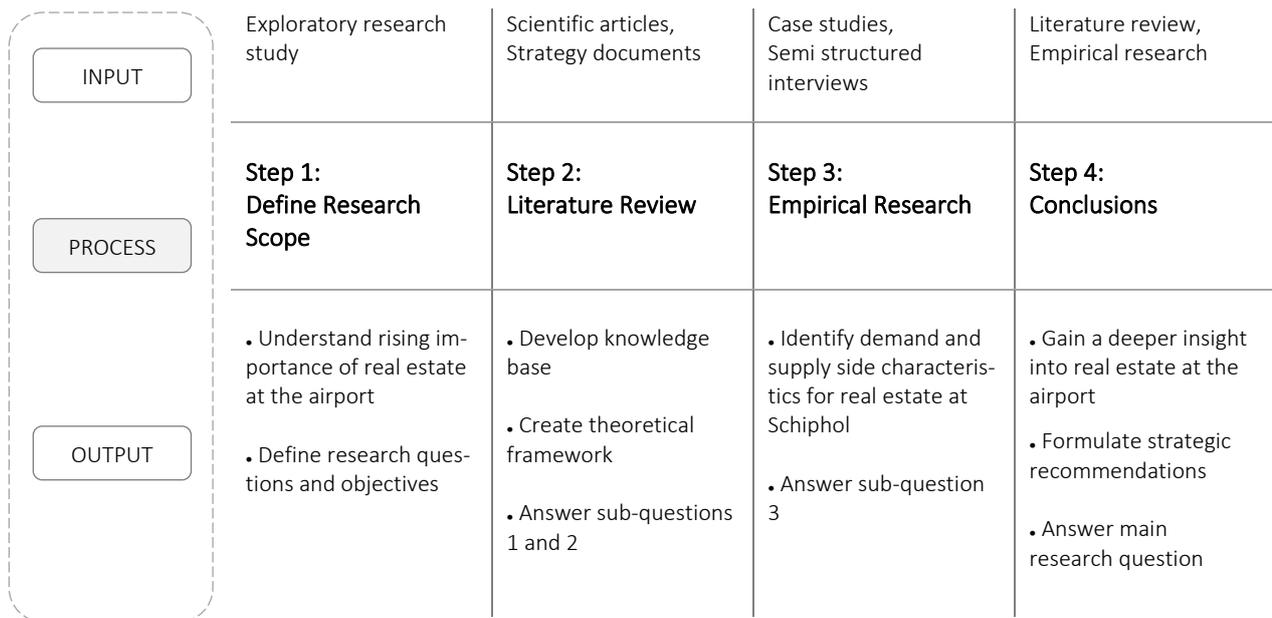


Figure 2. Research process for the study (own illustration)

3.3 Research Techniques

As mentioned before in Table 1, three main techniques have been proposed for this research, literature review, case studies and semi-structured interviews. These research techniques can mainly be divided into three stages. The first stage consists of creating a theoretical framework for the research through a literature study. This will be further explained in this section. The second stage is classified as the empirical research, which involves case studies and conducting semi-structured interviews with the selected knowledge corporations, this is explained in further detail in PART III Empirical Research. And finally, the findings from the literature study and the empirical research are combined and analysed to showcase the findings from the research. The approach taken for the literature study has been explained below:

Literature review:

The literature review is approached through a descriptive type of literature study, in which the primary concepts for the research are analysed through a number of scientific articles and official reports, with the aim of creating a narrative (Bryman, 2016). In the beginning, a number of reports regarding Schiphol Airport and the Mainport strategy of the Netherlands are studied, which helped to identify the research problem, and hence form the research questions. Subsequently, to understand the phenomenon of the Airport City and the spatial developments around the airport which cater to the emergent knowledge economy, various scientific articles and published books specific to the topic were studied.

The main aim of the literature study is to create a theoretical framework to understand the primary concepts in the report. It is important to learn about the information already present about the topic in scientific texts, which also helps to define the themes that need to be further studied through the case study methods. Through this literature review, sub-questions 1 and 2 have been answered, while setting up the base for the empirical and operational part of the research.

For sub-question 1, the literature provides information about how the Mainport strategy was set up for the Netherlands, and the role of Schiphol Airport as an economic generator. Then, the development of non-aeronautical activities, and specifically the Airport City phenomenon is explained. For sub-question 2, the literature provides information on the emergence of the knowledge economy, and how numerous knowledge-intensive corporations tend to locate within close spatial proximity, forming knowledge precincts, for efficient sharing of knowledge. The section concludes with the airport as the new knowledge precinct, and the spatial developments that occur around it.

3.4 Validating the data

According to Yin (2013), three main techniques can be applied to this type of a research, to guarantee a sense of validity of the data collected:

- Internal validity: in order to identify the appropriate operational measures, multiple tactics can be implemented, to use a number of sources of evidence during collection of data, to form a chain of evidence also during data collection and have a draft case study report checked by other members.
- External validity: by using the type of 'how' and 'why' research questions, and ensuring that the findings from the case study are valid beyond the specific case and can be presented in a generalised manner.
- Transferability: to ensure that the results from this study can be transferred to other settings with similar circumstances.

04 Research Framework

The purpose of this chapter is to provide a general overview on the way the research is approached, specifying the grounds for the research problem, areas for theoretical and empirical research and the operational section for the thesis, as shown in figure 3.

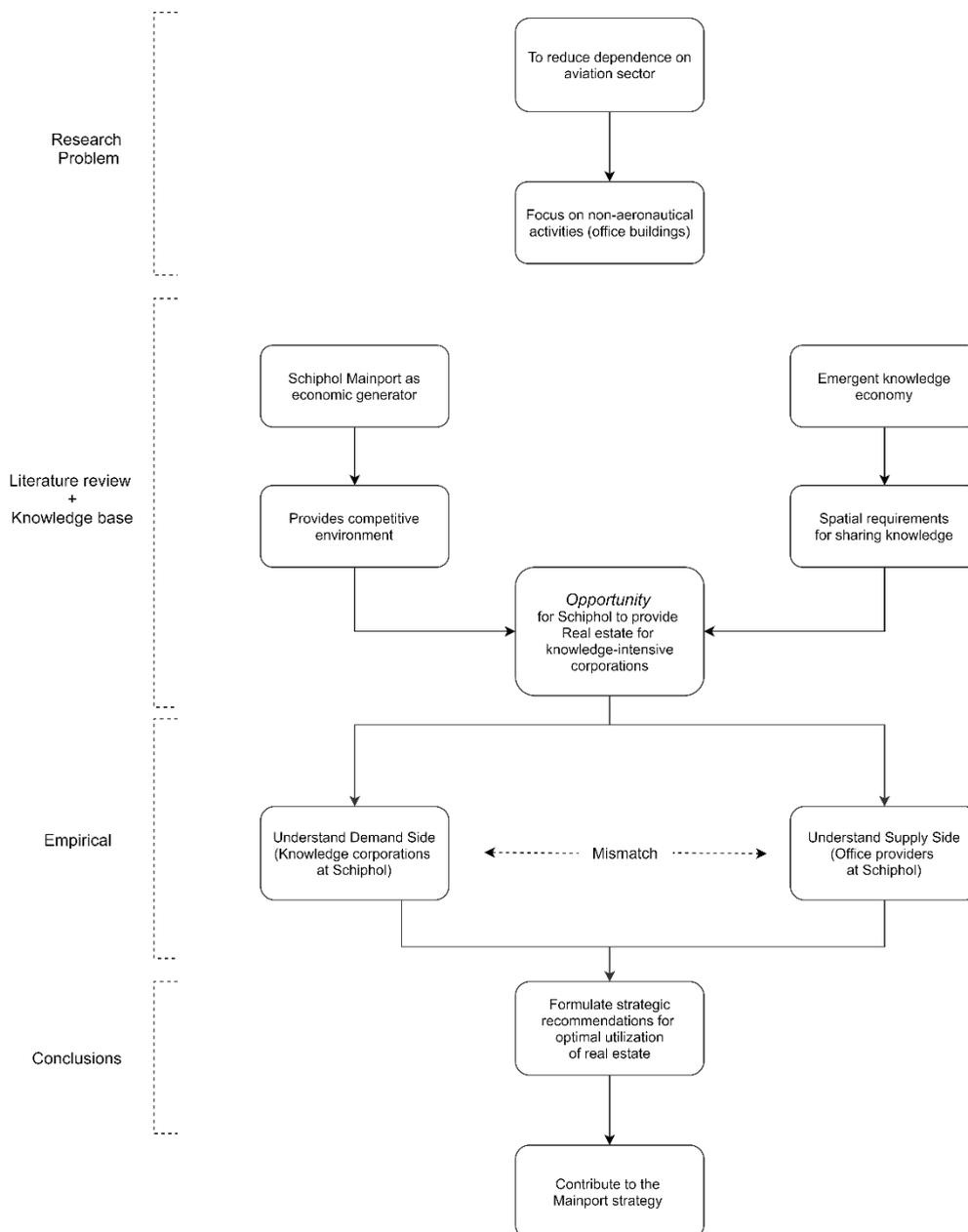


Figure 3. Research framework for the research (own illustration).

05 Research Output

Goals and objectives:

The aim of this report is to produce a strategic recommendations for a set of functional programs, in a way that the real estate at Schiphol is utilised optimally for these corporations to locate there and at the same time, understand the vision of Schiphol as a Mainport. With Schiphol providing space as a service, it is important to understand the demands of the knowledge-intensive corporations and to ensure that the current real estate facilities offered complement their demands.

Dissemination and audiences:

This research proves to be particularly important for the real estate department of Schiphol Amsterdam Airport, that functions under the Schiphol Group. Other real estate professionals, working particularly with airports and airport cities, might also find this report insightful as it tries to give a structured approach to the commercial office spaces around an airport, and the importance of such an approach for airports to develop and cater to the knowledge economy and to serve as an ideal business location.

II. Literature review

The aim of this section is to create a literature review that forms the knowledge base of this research. As mentioned in the methodology part of the paper (03 Research Methods), a narrative style of literature review is used, wherein disconnected information on the relevant topics for the research is collected and presented in the form of a narrative, which helps to give an overview of what is known about the subject. The primary topics that are addressed in the research are presented in this section and are used to answer research sub-questions 1 and 2. To answer the first sub-question and with the aim of understanding the Mainport Strategy of the Netherlands and the role that Schiphol plays in this strategy, part 01 is presented. This section also sheds light on the emergence of non-aeronautical activities around the airports and how this contributes to the overall revenue generation for the organisation. Next, part 02 is presented, which helps to answer the second sub-question and shows how the generation and sharing of knowledge has become the primary driving force in the new economy, and how a number of knowledge intensive firms tend to cluster together to form 'knowledge precincts'. The section ends with highlighting how the airport acts as an ideal location for the development of the knowledge precincts, and the spatial developments that have occurred around them.

01 Schiphol Amsterdam Airport as the Mainport for the Netherlands

Over the past decades, the Netherlands has strengthened its stand hold in the world economy by building up on its past specialisations of trade, transport and distribution, amongst others. A major credit for this position of the country, goes to its geographic location, that is exactly between the Atlantic world and the Eurasian continent, and the potential of the Netherlands to connect the two worlds (De Jong, 2006). According to the DHL Global Connectedness Index (GCI) of 2018, the Netherlands ranked the highest for being the most connected country in the world; this has been defined in terms of both, breadth (the extent of international coverage around the world) and the depth (the intensity of the connections) compared to the other countries (Altman, Ghemawat, & Bastian, 2018).

In today's fast paced economy, the process of globalisation has influenced high economic activities concentrated in certain 'global city regions' which compete with each other. Amsterdam has built up its position as an important and strategic centre for various national and international head offices of the financial and service sectors. In the Globalisation and World Cities (GaWC) rankings, Amsterdam has positioned itself as an 'alpha city' and is seen as a major economic state and region to the world (Loughborough University, 2018). According to Schaafsma (2010), the global position of a city region is influenced by the direct destinations that are connected via its airports, thus, creating a strong connection between the airport and the region. In the case of Amsterdam, a major reason for its success can be linked to the development of the Schiphol Amsterdam Airport and its home based airline KLM, for creating a hub airport which takes a centre stage in the global airline networks (Schaafsma, 2015).

Section 1.1 provides an overview of how the national airport of the Netherlands, Schiphol Amsterdam Airport, developed. This can be divided into four major time periods: start (1916-1945); limited growth (1946-1967); rapid growth, expansions and relocation plans of airport (1968-1985); and the Mainport strategy (1985 and onwards) (Dierikx & Bouwens, 1997). A brief history of these phases in the lifecycle of the airport is given, and depicted in a timeline in figure 4. Section 1.2 focuses on the 'Mainport' concept of the Netherlands which regarded Schiphol airport and the seaport Rotterdam as economic growth engines of the country. Sections 1.3 and 1.4 show the role that Schiphol Amsterdam Airport played in the Mainport strategy, and its added value and economic effects in the Dutch economy. Finally, section 1.5 gives an overview of the development of non-aeronautical activities as the landside development of the airport, and subsequently introduces the concept of the Airport City. Thus, the first research sub-question "*What is the importance of non-aeronautical businesses for Schiphol as a Mainport?*" is answered through the following sections.

1.1 Development of Schiphol Amsterdam Airport

Initially, as seen in figure 4, Schiphol was founded as a military airport in 1916, but after the end of the war in 1918, the need for a military base declined. Around the same time, civil aviation had seen an increase in popularity around the world, and Schiphol's function was changed to that of a civil airport (Schaafsma, 2015). The Dutch state did not invest heavily in the airport, and it wasn't until 1926, when the airport was sold to the Municipality of Amsterdam, that extensive developments started. Major investments were made to make sure that Amsterdam became the national airport, and the status was not lost to Rotterdam or The Hague. For the Olympic Games of 1928, held in Amsterdam, the Schiphol Airport was equipped with state of the art facilities, with the former Dutch colonies linked directly through direct air routes, thus, transforming the airport into a primary competitor in the European aviation industry (De Jong, 2006; Huijs, 2011; Van Wijk, 2007).

Due to the events of the Second World War, the airport needed to be reconstructed and the Dutch national government saw an opportunity and decided to take up this task and link it to the economic growth of the country. Even though the construction for this took more than ten years, the public limited company called Schiphol Group was formed with the Dutch government and the municipalities of Amsterdam and Rotterdam being part of it (Dierikx & Bouwens, 1997).

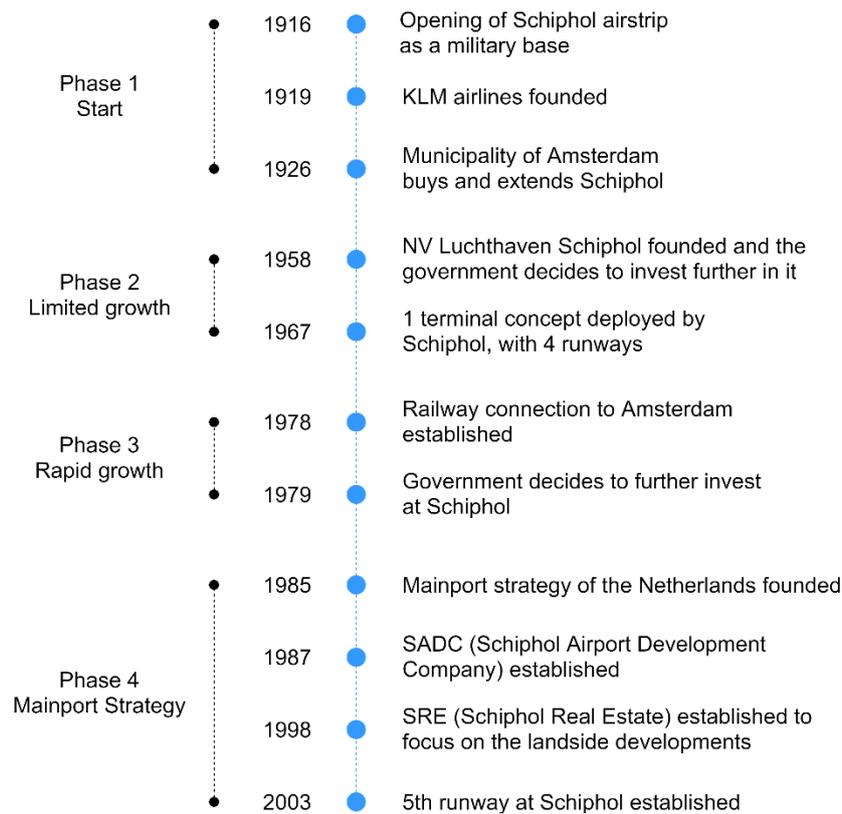


Figure 4. Timeline showing the development of Schiphol as divided into four main phases (Dierikx & Bouwens, 1997)

Then came the phase of rapid growth, where, in the 1960s, the aviation industry saw significant developments. The airplane became a more convenient mode of transport, due to the increased ease of flying and the growth in the number of long distance flights. The use of jet engines was also seen as an important development during this stage, as it helped to reduce the overall costs in the aviation industry and further supported the trend. With this, Schiphol was able to grow substantially and established itself as a location with strong connections around the world, to the UK, north European countries, across the Atlantic with North America and even with the Eastern part of the world (Huijs, 2011; Schaafsma, 2015).

Schiphol opened its new terminal in 1967 with the 'one terminal concept' which proved to be a crucial marketing strategy and attracted large number of passengers and cargo. With increasing infrastructural facilities, Schiphol grew into a multimodal node with diversified functions and showed the beginning of separation between the airside and the landside (Hakfoort & Schaafsma, 2000). The number of transfer passengers increased exponentially during the 1980's, and as shown in a detailed study called 'De Economische Betekenis van Schiphol' (translated: the economic importance of Schiphol), the growing importance that Schiphol had for Amsterdam and the overall Dutch economy (Dierikx & Bouwens, 1997; Huijs, 2011).

The 1980's marked an important period for the SAA when the Dutch national government, Schiphol Group and KLM decided to promote the country as the primary distribution centre of Europe with the strategy of 'Holland Distribution Centre' which was built on the strong pillars of Schiphol airport and the Rotterdam seaport (Dierikx & Bouwens, 1997). Schiphol handled over 12 million passengers in 1985, which was a third as compared to Heathrow and half as that at Frankfurt. Potential Japanese and American companies were enticed with the idea of the Netherlands being an internationally connected destination with a gateway function to the rest of the world (Schaafsma, 2015).

1.2 The 'Mainport' Concept for the Netherlands

The fourth and final stage in the development of Schiphol can be defined post 1985, when a free market developed, and with the aviation industry on the rise, a selected number of airports throughout Europe had a chance to develop a prominent position (Schaafsma, 2015). The Dutch national government was ambitious to position the Netherlands as a gateway to Europe and promote the concept of 'Holland Distribution Land', based on the locational advantages that Schiphol and Rotterdam offered (Dierikx & Bouwens, 1997; Van Wijk, Brattinga, & Bontje, 2011). Following this, in the Fourth Report on National Planning, the "Mainport" concept was put forward and adopted, focusing primarily on the national economic growth. Mainports were meant to be engines of economic development and cornerstones of the Dutch economic system, to improve the position of the country in the international market (Schaafsma, 2010). For this role to be realised, the government also laid special emphasis on developing infrastructure for connections to the hinterland, for the Mainports to function as gateways to the country (De Jong, 2006; Huijs, 2011). As both the ports, the port of Rotterdam and the Schiphol airport, had already experienced rapid growth, the aim of the Mainport strategy was to shift the focus on 'strengthening' rather than 'spreading', which had already developed significantly (Kuipers & Manshanden, 2010).

With the so called 'logistics revolution' that started in the mid-80's, a number of companies decided to lay emphasis on logistics management as a focus area, which was an important pull-factor for them to locate their offices and warehouse functions at the Mainports (Kuipers & Manshanden, 2010). During the past decades, both transport nodes have occupied prominent positions as hubs in the international market while showing a constant growth in terms of volume, with the airport at 8%, compared to that of the seaport at 2.5% per annum (Hakfoort, Poot, & Rietveld, 2001).

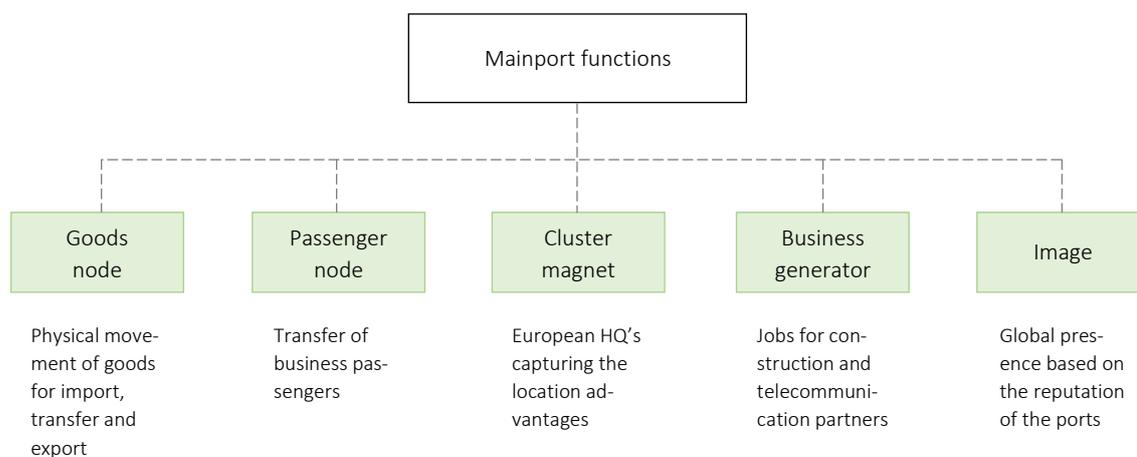


Figure 5. The five main functions of the Mainport as described by Priemus (2001)

According to Priemus (2001), the Mainport, which has evolved from just being a transport node into a generator of economic activities, has five well-defined functions as shown in figure 5.

1. Mainport as a Goods node: One of the primary functions of the Mainport is the physical movement of goods, for import, transit and export of finished and semi-finished goods, which is dependent on its connectivity and accessibility provided with an integrated network of different forms of transport such as sea, air, rail and road coming together.

2. Mainport as a Passenger node: Along with goods, the transfer of business travellers is also a primary function of the transport hub, with staff from Dutch companies, staff of international headquarters situated in the Netherlands, and other business associated people traveling to and from the country.

3. Mainport as a Cluster Magnet: Due to the locational advantages, a number of corporations from the same sector, or ones that are dependent on each other in the value chain network, tend to settle in the vicinity of the Mainports to take advantage of the services offered along with the knowledge spill over and a specialised labour market due to the pool of skilled workers available in the area. This is especially evident around the Schiphol Airport, where due to a number of European headquarters, there is a significant demand for related services such as IT companies to settle there.

4. Mainport as a Business Generator: The extensive infrastructural network, provided at the Mainports, which also uses complicated software systems, generates jobs, such as those from the construction industry and the IT sector.

5. Mainport as an Image: Along with the physical factors, the Mainport is also characterized by soft features, which include an internationally oriented reputation due to the city where it is present and the port itself, which appeals to a number of corporations to set up there.

These factors show that the Mainport strategy was not only focused on the physical transportation of goods and people, but also had a pivotal role in creating economic development for the area and the country. With Schiphol being the point of focus for this research, it is important to further emphasize on the subject, and to see the role the Schiphol Amsterdam Airport, in particular, played in the Mainport concept.

1.3 Schiphol Amsterdam Airport as ‘Mainport’

After being appointed as the Mainport in 1985, spatial economic strategies were planned around the Schiphol Airport in order to attract logistics centres and European corporate headquarters to locate there. A number of American and Japanese companies set up their corporate offices and warehouses around Schiphol in the 1990’s, which led to an economic success characterised by increasing land and rent prices around the airport (Van Wijk, 2007, 2011). Van Wijk et al. (2011) mention two main factors which contributed to a unique advantage that the international corporations saw in locating around the airport. Firstly, increased accessibility, which was a result of the connectivity of Schiphol, not only internationally, but also through its in-land networks (the rail and roadways), and secondly, close proximity to the city of Amsterdam which had become an economic capital of the world in the 90’s and a gateway into Europe. In the early 2000’s, due to the heavy demand of space, office and warehouse rents around the Schiphol area increased to the extent that they were the highest around the country, more than those in the inner-city regions of Amsterdam and the new business district of Zuidas.

A number of authors regard the Mainport strategy a success (Knippenberger, 2010; Schaafsma, 2015; Van Wijk, 2011), due to strong coordination between the aviation sector, and the national, regional and local governments, which led to Schiphol’s strong position in the aviation market of Europe, claiming the third spot in cargo volumes and fourth in terms of passengers. The Schiphol Area Development Company (SADC), a public private partnership, which included the Schiphol Group, the province of North-Holland, and the municipalities of Amsterdam and Haarlemmermeer, along with investments from the national bank, was established to share the economic benefits of the extensive land developments. The relationship between the different actors involved in the partnership have been shown in figure 6. The Bestuursforum Schiphol (a governmental forum) was installed to provide guidance to SADC to buy and develop the land around the airport (Schaafsma, 2010).

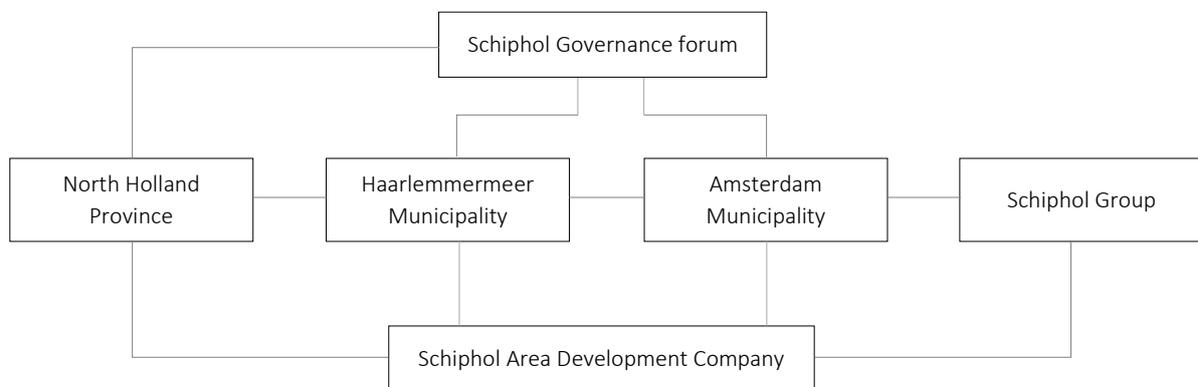


Figure 6. Actor relationship between the various stakeholders involved at the Schiphol Airport (Schaafsma, 2001)

As mentioned before, with its continued growth in the aviation sector, and to exploit the economic potential of the airport location, Schiphol Group gradually started expanding its real estate sector, parking facilities, retail and other business sector services (Van Wijk, 2007). The early 2000’s showed that a large number of international corporations, especially from the knowledge-intensive sector of the economy, such as IT and telecommunications, finance, management and consultancies, preferred the regions around the airport as favourable business locations (Conventz, 2010). Along with this, the Schiphol Mainport has had a significant economic impact on its immediate vicinity, as well as the bigger region of Randstad, as discussed in the next section.

1.4 Added value and economic importance of the Schiphol Mainport

In the 'Transport Files' published by the European Union (2019), the Mainport of Schiphol Amsterdam Airport has been regarded as one of the most important factors contributing to the national economy of the Netherlands, with the annual added value estimated at around €9 billion for the year 2018, and over 114,000 jobs generated related to the airport. At the same time, it is important to note that the 'Economische Effecten Schiphol' (Economic Effects Schiphol) report published by Bleumink, Van Der Zanden, Manshanden, Koops, Snelder, Veldhuis, Koopmans, Rosenberg, Lieshout (2006), almost all of the Origin-Destination traffic at the Schiphol Airport comes from the Dutch hinterlands, this includes Dutch residents and the companies established in the Netherlands, or other international companies that have the Netherlands as their final destination. The report also predicts the Randstad as the most crucial source of the Origin-Destination traffic with about 75% of the traffic estimated from the region. Two primary functions have been defined for the Mainport (European Commission, 2019):

1. The hub function, which is characterised by the extensive network of inter and intra continental connections transporting passengers and freight between different countries
2. The urban area in which the airport is located, which serves as a suitable business environment for a diverse, substantial and high quality service corporations to set up.

Research based on the regional economic equilibrium model, shows that the economic effects produced by Schiphol can be divided into four main categories, as shown in figure 7, namely: '*direct effects*', which is directly linked to the aviation sector, such as transport of passengers and freight, airport management and services, airport security, maintenance of aircrafts; '*indirect backward effects*', related to industries that supply products or services to the aviation industry, such as in flight food catering, jet fuel suppliers, travel agents; '*indirect forward effects*', related to general economy which is affected by the aviation employee spending on everyday items such as grocery and household products; and lastly the '*catalytic*' or the '*location effect*', which involves industries that were established in the region and for which the airport is a crucial location factor (Bleumink et al., 2006; Knippenberger, 2015).

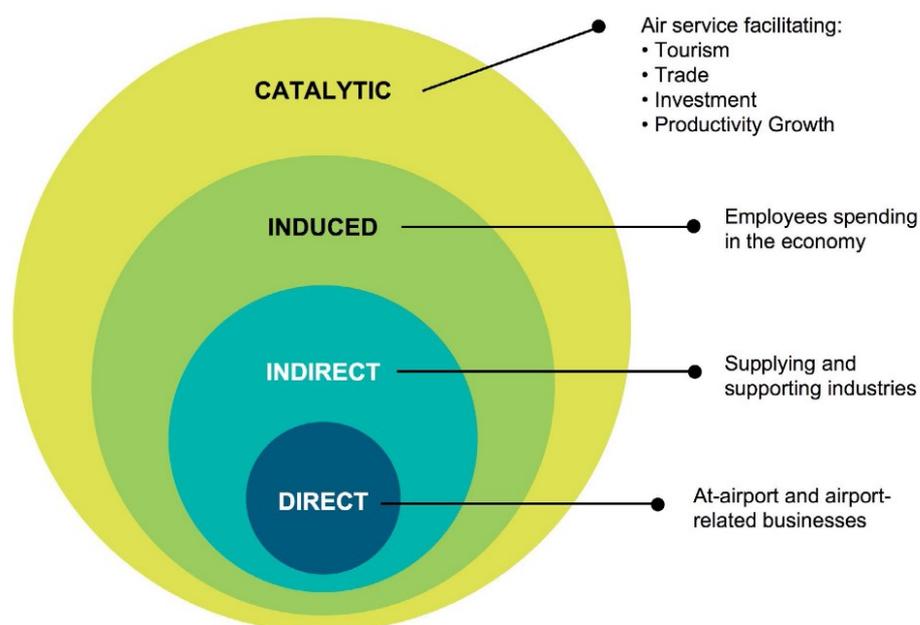


Figure 7. The economic effects of Schiphol Airport on its surrounding region (Intervistas, 2015)

Focusing on the ‘catalytic effects’, the economic activities that locate in the area are heavily influenced by the overall attractiveness of the region, due to the presence of the airport and the extensive network connections (Bleumink et al., 2006). The Netherlands is a country with a small home market, and an open economy based on trade and high quality international connectivity to other countries. Research by Kuipers and Manshanden (2010) shows that if the corporation is highly dependent on the aviation industry, chances are that the company will be located at a short distance from Schiphol. According to them, this phenomenon is not dependent just on the number of flights from the airport, but also the quality of the network as this enables the companies to be more flexible and adapt to unforeseen changes in the future. However, high international connectivity is not just about a physical infrastructure, but also presence of a number of internationally oriented companies, that decide to locate in the Mainport region, thus forming a complex of diverse networks.

According to research done by Decisio (2015), Schiphol Airport plays a major role in the decision of a large number of European Headquarters (EHQ) and European Distribution Centres (EDC) to locate in the region. Although the exact share of economic contribution of these companies is still not clear, their decision to locate in the vicinity is related to the presence of Schiphol. A report of the economic analysis of European airports by Intervistas (2015), showed that the direct, indirect and induced economic impact of Schiphol in 2013, as shown in figure 7, was estimated at 8.27 billion €, thus contributing to over 2.2% of the national GDP of the Netherlands. Whereas, the catalytic economic impact generated over 6.67 billion €, thus contributing to 2.3% of the national GDP.

Kuipers and Manshanden (2010) argue that over the past two decades, since the strategy was first deployed, the role of Mainport Schiphol has evolved, from being initially perceived as an ‘engine’ for economic growth to now been regarded as a ‘facilitator’ for overall development of the Randstad area. Earlier research done by Bleumink et al. (2006) aligns with this theory, and their findings show four well-defined economic sectors that the Schiphol Mainport contributes towards, as seen in figure 8.

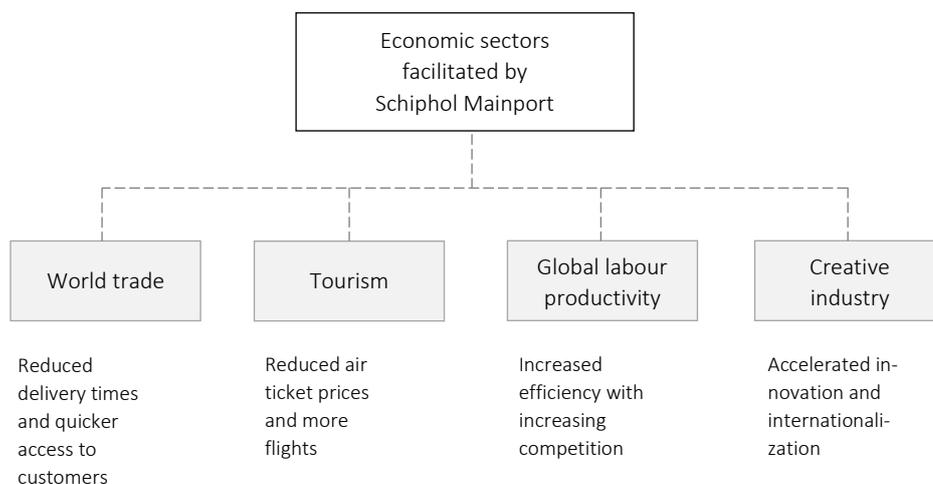


Figure 8. Economic factors accelerated by the Schiphol Mainport (Bleumink et al., 2006)

1. World trade: With the increased globalisation, aviation has opened up world markets. A number of European Distribution Centres (EDCs) have been established around Schiphol thus maintaining the status of the ‘Netherlands Distribution country’. This has also led to an increase in the efficiency in the supply chain, wherein, aviation has shortened the delivery time of goods, which enables companies to deliver to their customers quickly and reliably, thus reducing costs.

2. Tourism: Aviation has highly influenced tourism, especially with improvement in the aviation technology, reduced air ticket prices and the increase in the number of flights.

3. Global labour productivity: By unlocking the global markets, aviation has brought companies closer to each other, while exposing them to a wider competition, which stimulates them to work more efficiently.

4. Creative industry: Aviation also acts as an accelerator for innovation, due to internationalisation, i.e., effective global networking and collaboration being made possible across the world (Bleumink et al., 2006). Due to the strong presence of the creative sector in Amsterdam, i.e., knowledge and information generation industries, and the strong history of the region as a trading platform, a number of European headquarters prefer the area as a suitable business location (Kuipers & Manshanden, 2010).

This has led to an increased overall foreign direct investments (FDI), a number of internationally oriented companies prefer to invest in the Schiphol area. This brings not only high quality business services, such as financing, consulting and insurance into the area, but also other supporting activities such as IT services, certification companies and temporary employment agencies, thus creating a strong business network (Kuipers & Manshanden, 2010).

On one hand, over the past decades, the growth of Schiphol Mainport has seen substantial economic development for the region, while on the other hand, this is accompanied by two negative effects as shown by Kuipers and Manshanden (2010), namely:

1. The phenomenon of agglomeration diseconomies can be seen (also called push factors), which has partly developed due to factors such as increased congestion, noise and space pressure. These can be associated with the success of the Mainport and increasing volumes of goods and people, which puts pressure not only on soft factors such as rising housing demands in close proximity to the airport, but also on the physical infrastructure such as the roadways and the railways.

2. External economies of scale has increasingly become a commodity that is being imitated by other locations (which act as pull factors for these new regions), such as Antwerp, and regions in northern France. This is evident by the strong foreign direct investments that these areas are able to attract.

Over the years, SAA has been a highly influential economic factor for the Randstad area, from generating jobs for the people, to attracting foreign investments. To accommodate these activities, the airport needs to invest in infrastructure and real estate facilities. Similarly, around the world, airports have evolved from their roles as just a transport node, to a multifunctional hub that focuses on diverse sectors other than aviation. The next section sheds light on the non-aeronautical businesses of airports and the increasing focus on them.

1.5 Non-aeronautical businesses and the Airport City

According to Thierstein and Conventz (2014), over the past decades central nodes of transportation with high accessibility and connectivity such as sea-ports, high-speed rail stations and airports, influence major urban activity close to them, acting as catalysts for initiating and shaping spatial development in the area. In the 1970's and 80's the commercialisation trend in the aviation industry, forced major changes in the economic structure of airports forcing the authorities to lower landing fees for aircrafts to attract more airlines to the airport (Van Wijk, 2007; Freestone, 2009). This led to an increased pressure on the revenue generated through aviation activities, which forced the airport authorities to consider other forms of income, and thus invest in a secondary business activity: the non-aeronautical sector, to support the traditional core business (Conventz & Thierstein, 2015a). With the increasing competition between various airports, the main idea behind this additional business opportunity was to fund the steady growth and maintenance of the facility, at the same time reducing the flight-landing and operating costs to attract airlines and passengers (Arup, 2016; Burger, 2015).

The non-aeronautical activities started with mainly retail establishments such as shopping malls and arcades, and quickly spread to other major real estate developments such as hotels, offices, conference facilities, logistics centres and other supporting functions such as parking spaces, as shown in figure 9 (Sieverts, 2015; Thierstein & Conventz, 2014; Van Wijk, 2007). As Freestone (2009) calls airports as "hubs of flow", it is important to realise that the continuous movement of people and cargo through the facility is what contributes to the initiation and use of the non-aeronautical facilities. Revenues generated from the non-aeronautical businesses in some of the prominent airports around Europe, such as Zurich, Copenhagen, Munich and Oslo account for close to 50 percent of the total airport operators' profits. This shows how important the real estate developments and the retail facilities have become for the airports (Conventz, 2010).



Figure 9. Different sectors which make up the non-aeronautical activities around an airport (own illustration)

Airport authorities perceive these landside real estate developments as more than just a supplementary source of income, rather they see the advantage in diversifying, to maintain a steady fiscal flow in the case of unforeseen circumstances in the aviation industry (Hirsh & Van der Horst, 2018). American urbanist, John Kasarda (2000) states that these developments are beneficial not only for the airports, but also to enhance the economy of the region they are located in, and coined the term 'Airport City' to describe this unique spatial development.

The conceptualisation of the Airport City, as shown by Kasarda has been depicted in figure 10. Airport City usually developed around hub airports, attracts a number of internationally oriented companies due to the high frequency of flight movements, which provide the knowledge workers direct access to virtually every business destination around the world (Conventz & Thierstein, 2015b). The Airport City in Europe is characterised by two vital locational components: first, the worldwide connectivity due to its proximity with the airport, and second, landside connectivity to other parts of the hinterland through different modes of transport (Thierstein & Conventz, 2014).

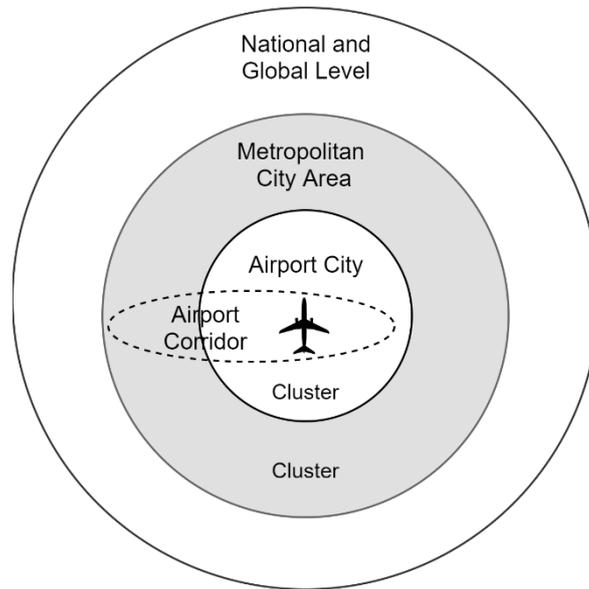


Figure 10. The airport city model as proposed by Kasarda (2000)

The Airport City presents a highly attractive business location with scope for real estate growth and development in this sector. With a number of actors usually involved in this development, such as the airport authority, the local municipality, and other private and public actors, several authors have defined two approaches to accommodate the business activities, namely 'protect the site', and 'exploit the site' approaches (Van Wijk, 2008; Van Wijk et al., 2011). First, 'protect the site approach' is usually advocated by aviation specialists, who prefer strictly aviation related activities, such as maintenance of aircrafts and handling of cargo, to be located around the airport. These experts are not against the idea of development, but take the more cautious approach to avoid overcrowding and congestion, to prevent the fall of the airport due to overdevelopment. Second, 'exploit the site approach' has a more corporate outlook, and is promoted by experts who believe that economic activities which have the greatest added value and can generate the highest land and rent levels need to be accommodated at the Airport City (Van Wijk, 2008; Van Wijk et al., 2011).

Several authors state that in this post-industrial economy, the evolving function of airports from just infrastructural facilities to attractive real estate locations consists of a complex interplay of a number of forces, a subject which is yet to be explored in-depth (Appold & Kasarda, 2012; Thierstein & Conventz, 2014). Kasarda (2004) calls the airport as the centre of the new emerging city which is driven by the knowledge economy, stating that airports around the world have seen a sprawl of warehouses being developed around them. This somewhat haphazard spatial development calls for a more systematic urban development approach (Kasarda, 2004), for the better utilisation of the real estate facilities into notable forms of revenue generation (Arup, 2016). In this context, Conventz and Thierstein (2015b) have highlighted the fact that the airport needs to enhance the attractive locational characteristics, which are currently mainly influenced by the multimodal accessibility feature, for the airports to continue to be an attractive business location for knowledge based corporations. In order to comprehend and better understand the spatial changes in this region, a number of factors will be analysed in the next section which are influenced by the views of Thierstein and Conventz (2014), and focus on the relationship between the knowledge economy and the role of real estate developments at airports in this economy.

02 Airports and the Knowledge Economy

Kasarda (2004) calls airports as main drivers in the “economy of speed” of the 21st century, wherein great importance is given to the movement of the people and goods, which have a significant influence on the spatial developments around the airports, i.e., the land use, infrastructure and real estate. The evolution of the Airport City can be regarded as the fifth wave in the development of human settlements around transport hubs, which has moved from seaports, rivers and canals, railways, highways and now around airports, and is mainly influenced by the knowledge economy. To understand this phenomenon further, the following sections answer the second sub question “*How does the knowledge based economy influence the commercial real estate developments around airports?*”. Section 2.1 focuses on the emergence of the knowledge economy and the phenomenon of globalisation. Section 2.2 then discusses the emergence of the knowledge precincts and 2.3 focuses on the role of the airport in this new economy, which is influenced by geographical or spatial proximity to other businesses and accessibility to business locations. This section then ends with drawing conclusions from the previously explained parts of the theoretical framework and connecting the knowledge precincts to the Mainport function of the Netherlands.

2.1 The emergence of the knowledge economy and globalisation

Rychen and Zimmermann (2008) mention two factors which primarily contribute to the increasing interaction between firms and regions, namely, the emergence of the knowledge economy and the globalisation phenomenon. Firstly, due to a number of developments in the economic, political and technological sector, one of the most influential trends in the business world has been a move from the natural-based economy to a knowledge intensive network economy (Archibugi & Lundvall, 2002; Conventz & Thierstein, 2015a). There has been a shift in the importance given to traditional production aspects such as land, labour and capital, to the creation and sharing of knowledge, which can be regarded as a fourth resource of production. A number of researchers have noted this transition from a more manufacturing based economy, to a more service centred one, often called as the post-Fordist or post-industrial economy (Bell, 1973; Hirshcorn, 1984; Shapiro & Varian, 1999). To get a deeper insight into this emerging economy, Powell and Snellman (2004) describe it as knowledge-intensive activities that lead to the production of services, which in turn contribute to increased advancements in the scientific and technological fields. Rather than being dependent on traditional natural resources and physical inputs, the economy is now focused on the intellectual capacities of the worker, which contribute to improvement in the production process through more intensive research and development, with the worker being regarded as the most important wealth creator (Appel-Meulenbroek & Haynes, 2014; Baker, 2014; Kastelein, 2014).

Secondly, globalisation has strengthened connections between different parts of the world through improved modes of transportation, communication and ICT developments, and has made sharing of knowledge and learning easier (Archibugi & Lundvall, 2002). As per the views of Bleumink et al. (2006) this trend is accompanied by the increasing importance given to the quality of the workforce in corporations, and the people regarded as the asset, with the physical structure playing a supporting role.

Along with these two changes, increasing literature has highlighted knowledge to be the focal point of economic development, with evidence showing firms, industries, regions and nations who focus on the efficient generation and sharing of knowledge display a faster rate of growth and development (OECD, 1996; Powell & Snellman, 2004). But, at the same time, it is important to understand the type of knowledge that is mentioned in these texts.

Michael Polanyi (1966) made a clear distinction between two types of knowledge, firstly, overt or codified knowledge which can be expressed and shared through a tangible medium such as an operating manual or a blueprint and does not require a personal experience for the knowledge to be communicated; and secondly, tacit or non-codified knowledge, which cannot be expressed in a materialistic form and cannot not be transmitted to another party without direct interaction. Continuing on the path of Polanyi (1966), Nonaka and Nishiguchi (2001) express the importance of the tactic knowledge in the new economy, while mentioning that only through joint activities and shared experiences, facilitated through physical proximity, can this knowledge truly be shared.

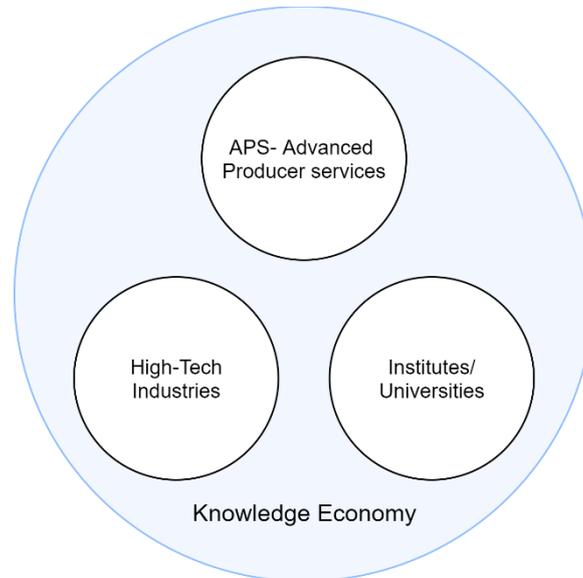


Figure 11. The three sectors of knowledge economy (Thierstein & Conventz, 2014)

Knowledge is seen as the key driver for research, innovation and development (Howells, 2002; Thierstein et al., 2006) and is classified as a vital component for all types of companies, ranging from advanced manufacturing and high quality producer services, to more traditional companies, in order to occupy a leading position in the international market while staying ahead of their competitors (Bathelt & Glückler, 2011). Powell and Snellman (2004) show that the focus of the knowledge industry has been on two main aspects, namely: first, creating stocks of knowledge, through developing intellectual, organizational and human capital; and second, focusing on the activities to create this stock, i.e., investing in education and training, and R&D facilities. This aligns with the ideas of Thierstein and Conventz (2014), who divide the knowledge economy into three main sectors, as shown in figure 11. First, Advanced Producer Services (APS), which include financial service providers, management consultancies, engineering and architectural specialist and logistics focused firms, which provide services based on knowledge and expertise, and information regarding process specialisations to other corporations and advanced manufacturers. Second, the High-Tech industries, which focusing primarily on R&D facilities to produce products with a worldwide appeal, employ mainly highly skilled labour, such as scientists and engineers. Third, is the knowledge producing institutions such as research facilities or universities.

Malecki (2010) describes that, along with the companies themselves, the regions in which they are located, i.e., their spatial factor, play a crucial role in determining supply of knowledge and calls this phenomenon as “the local nature of knowledge”, wherein the companies benefit from local knowledge spill overs and geographical proximity to similar firms or other firms in their value chain system. These areas, concentrating on knowledge intensive activities have been increasingly described as knowledge precincts by Yigitcanlar (2010), and will be discussed in the next section.

2.2 Emergence of knowledge precincts

As mentioned in the previous section, knowledge related activities, which are characterised by their tacit nature, have become pivotal in the creating wealth and employment, and supporting the economic growth of cities, regions and countries (Howells, 2002). According to Yigitcanlar (2010), knowledge as an intangible asset does not depreciate, but instead grows in value the more it is used and shared. This means knowledge based activities tend to locate in close proximity to one another in vibrant and well-connected urban locations, known as 'knowledge precincts', and this promotes the generation and exchange of knowledge, while creating local knowledge spillovers. Knowledge related work, as well as knowledge workers receive increasing emphasis in the new economy, with local authorities investing in the quality of the environment to attract and retain the workers (Florida, 2005).

On the same lines, Yigitcanlar, Baum and Horton (2007) propose a spatial development model focusing on knowledge precincts, called the 'knowledge-based urban development' model (KBUD), with the aim of creating socio-spatial order and enhancing the economic prosperity of the region. According to Yigitcanlar et al. (2008), rather than employing strict government policies, KBUD aims to facilitate the development of knowledge intensive areas by providing suitable incubation and learning environments that encourage the generation and sharing of knowledge between different corporations and knowledge workers. This has led to a number of cities and regions around the world to embrace the knowledge economy and promote concepts such as smart, well-connectedness and network, in order to create a competitive environment for knowledge corporations and its workers.

Knowledge precincts, that form the core of KBUD, can be defined as areas or centres of knowledge creation that are characterised by clustering of corporations focusing on knowledge intensive activities, such as R&D, ICT and telecommunications developments, finance, management and legal services (Henry & Pinch, 2000, Yigitcanlar, 2010). Yigitcanlar (2010) states that the knowledge precincts are built on the foundation of with two primary functions, firstly, to encourage the sharing of knowledge between various corporations, and promote the growth and development of small and medium enterprises (SME's), secondly, to act as a catalyst factor to foster the social-economic growth of a region. Yigitcanlar et al. (2008) mention five aspects, that characterise a knowledge based precinct, shown in figure 12, namely:

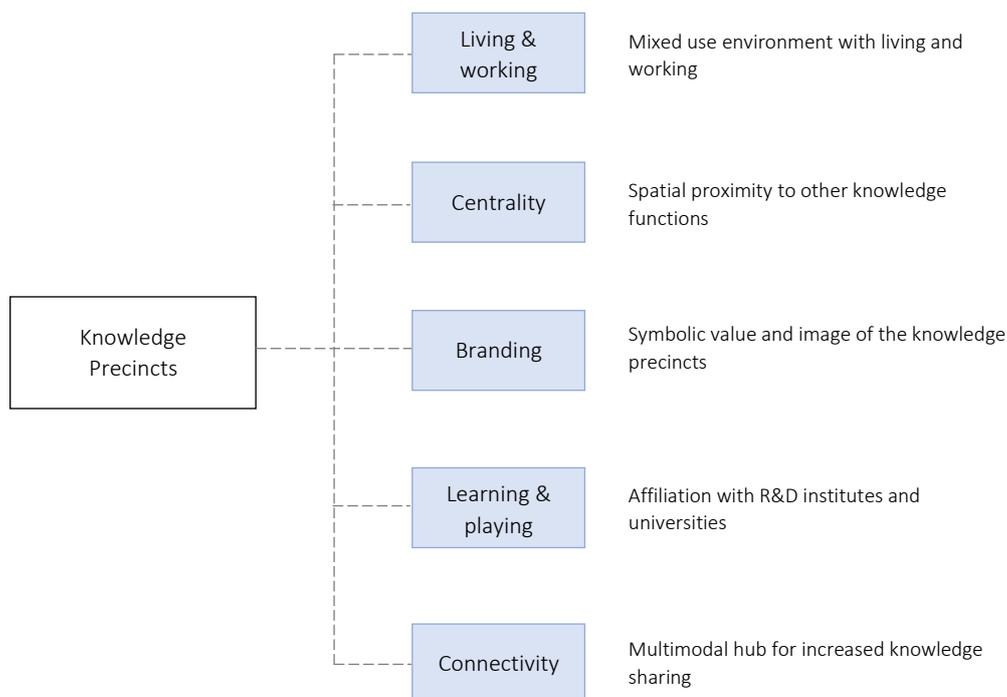


Figure 12. Main aspects of a knowledge precinct as defined by Yigitcanlar et al. (2008)

1. Living and working: Knowledge workers prefer a mixed used environment, where boundaries are blurred between living, working and learning activities, which provides more flexibility and resistance to external change.
2. Centrality: Since the firms locating in these precincts are well-embedded in the network society and depend heavily on increased interaction with other knowledge firms, they prefer to locate in central areas with close spatial proximity to other knowledge-functions such as financial, educational and technical institutions.
3. Branding: Softer attributes such as the symbolic value and the image of the knowledge precinct with a distinguishing identity, has significant importance for the corporations.
4. Learning and playing: Learning is highly valued in the knowledge economy, and a close affiliation to R&D institutes and universities forms an important part of the precinct.
5. Connectivity: One of the most vital aspects of the knowledge precinct is connectivity, as it promotes sharing of knowledge within the same precinct, as well as between different precincts, with more efficient modes of connectivity increasing the chances for interaction.

This aligns with the ideas of Button, Lall, Stough, and Trice (1999), and Dvir and Pasher (2004), who propose that the airport location provides an opportunity for a continuous flow of people, knowledge and ideas from and into a city. This allows the airport to develop into a knowledge precinct because of its status as a multimodal transport hub, supported by the national and international connectivity and strong infrastructure facilities. With the knowledge activities concentrating in the same location, the competition between the firms tends to increase, this forces them to innovate and generate further knowledge, thus increasing the competitive environment of the location (Porter, 1994). The airport further links itself with other precincts, which allows for knowledge to be exchanged not only at the local and national levels, but also provides access to other corporations at the international level.

Button et al. (1999) and Yigitcanlar et al. (2008) state that tacit or non-codified knowledge, which is considered as the key element of the knowledge economy, might be generated in one of the global precincts, but still needs to be transferred to potential customers, other global branches of the corporation, and/or other firms along the same value chain, this requires face-to-face interaction. Even in the case of codified knowledge, an initial physical interaction, helps to generate levels of trust that promotes sharing of knowledge between different corporations in the future. With the airport as the new urban magnet for knowledge based activities, a number of corporations locate in its vicinity, the presence of these corporations has an effect on the spatial agglomeration in the area, and influences other economic activities around them (Vissers & Dankbaar, 2013). These locational effects will be discussed in detail in the next section, while relating them to the role that airports can play in geographic or spatial proximity and relational proximity.

2.3 Role of the airport in the knowledge economy

According to Simmie (2003) and Boschma (2005), the knowledge-intensive companies not only generate and share knowledge through physical human interaction, but are also connected to their partner companies in different parts of the world, which should be easily accessible. On the same lines, Dyer and Nobeoka (2000) mention that the number of links that a corporation has, directly influences its knowledge sharing capacity and the magnitude of this effect. Thus, it can be said that within an airport setting, i.e., an Airport City, there are two main external forces that interact with each other in the process of knowledge generation, first, the agglomeration economies at the meso or regional level wherein a number of firms from the knowledge sector tend to settle around the airport; and second, the global network economies at the macro level, as shown in figure 13, wherein the knowledge intensive corporations take advantage of the inter and intra continental accessibility provided at the airport (Conventz & Thierstein, 2015a; Lüthi, Thierstein, & Bentlage, 2012).

1. Agglomeration Economies

Theories that define the location criteria of an industry or a firm have developed over the years, which relate to the spatial distribution of economic activities (Malmberg, Sölvell, & Zander, 1996). These external forces known as “agglomeration economies” define the physical concentration of a number of firms within the same geographic context, operating in the same local context, that helps them achieve higher levels of flexibility and efficiency by sharing a somewhat common pool of workforce, materials and other services (Desrochers, 2011). Lüthi et al. (2012) define three phenomena that define agglomeration economies:

a. Local clustering

Corporations and institutions in the knowledge economy tend to locate close to one another, forming clusters, which allows increased interactions between the workers (Rychen & Zimmermann, 2008). This gives them a competitive advantage and facilitates their innovation process, by increasing their productivity speeds and stimulating new businesses (Porter, 2000). Local clustering emphasises the fact that even though the location might not offer specific advantages for the corporation, the co-location of other similar firms in the area facilitates its decision to locate there, thus ensuring that spatial proximity leads to the creation and sharing of knowledge (Bercovitz & Feldman, 2005; Rychen & Zimmermann, 2008).

b. Geographical Proximity

The process of clustering is directly linked to geographical proximity, which contributes to increased face-to-face interaction between the firms and facilitates the transfer of tacit forms of knowledge and continued learning (Desrochers, 2011; Lüthi et al., 2012; Vissers & Dankbaar, 2013). Even with the latest ICT developments and faster means of transportation, personal contact is still perceived as the most suitable form of interaction to enable the transfer of tacit knowledge between different corporations (Saxenian 1994). Boschma (2005) describes a number of other proximities, cognitive, social, institutional and organizational, but mentions the fact that it is the geographical proximity that facilitates the other forms and increases the chances of knowledge exchange more than the others.

Desrochers (2011) and Lüthi et al. (2012) suggest that geographical proximity enables localisation and urbanisation economies. Localisation economies are formed when a number of related firms from the same sector settle within close spatial proximity in order to share the same resources and grow together under common market conditions (Desrochers, 2011). Urbanisation economies refer to the growing size of a city or region that enables diverse firms to settle in the area and benefit from the common facilities such as road networks or power supply, and also

allows for other service related corporations to develop such as law or consulting firms which contribute to the diverse businesses (Desrochers, 2011).

c. Creating knowledge pool and spill over

The emergence of these knowledge clusters, and the corporations located within close spatial proximity, leads to the formation of local knowledge pools which are specialised in certain activities and influence the learning and sharing patterns of knowledge between the firms (Howells, 2002).

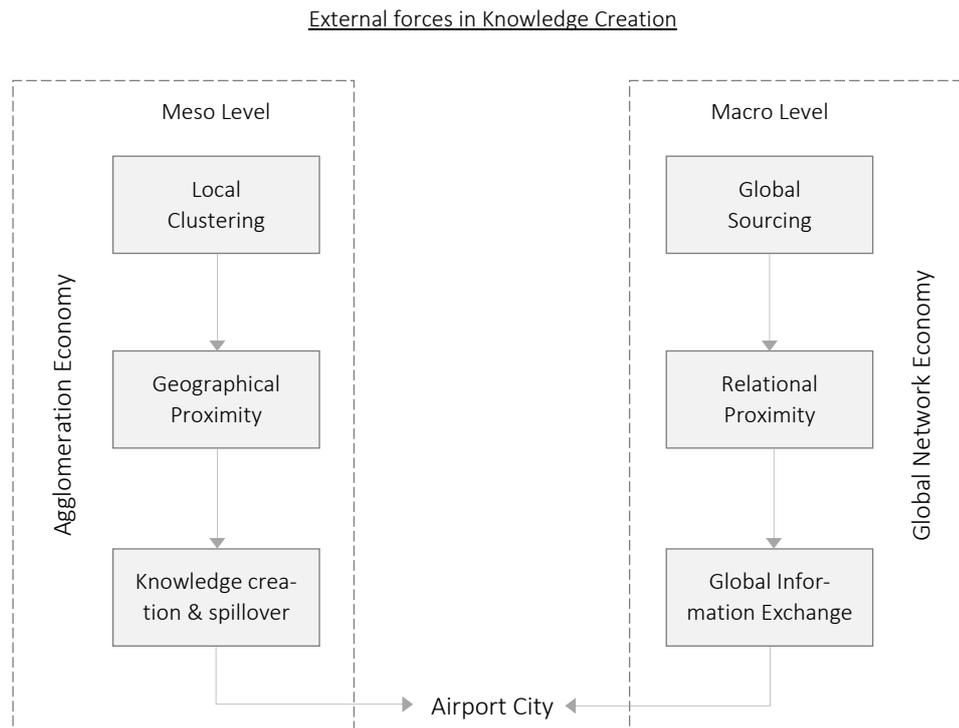


Figure 13. Interaction between different external factors in the knowledge economy at the Airport City (Lüthi et al., 2012)

2. Global Network Economies

According to Maskell, Bathelt, and Malmberg (2006), in the knowledge-based economy, which is transformed by the fast-paced globalisation, the economic prospects for the corporations are not just dependent on the local clustering, but are also highly influenced by external sources not in the immediate vicinity, and the ability of these clusters to generate and exchange knowledge efficiently. This aligns with the views of Boella and Van Der Torre (2006), who describe that the knowledge production process requires limited phases of direct face-to-face interaction, while maintaining contact with sources of knowledge situated far away. Thus, with the increased mobility, and the ease at which knowledge workers can travel to other locations, the constraint of immediate geographical proximity can be overcome and the knowledge exchange process can thus be seen as an interplay between local clustering and global accessibility to other business locations (Rychen & Zimmermann, 2008), which is facilitated by high speed rail connections and international hub airports, referred to as “global network economies”, as illustrated in figure 13 (Lüthi et al., 2012).

International hub airports, are the biggest type of airports, in terms of size and volume and accommodate a high share of transfer passengers and cargo. They form the home base for flagship aircraft carriers such as KLM, British Airways and Air France and are integrated into strategic aviation alliances such as Oneworld, Star Alliance and Sky Team (The Boston Consulting Group, 2004). Derudder, Devriendt, and Witlox (2007) describe a hub airport as part of a hub-and-spoke business model which can be seen similar to an image of the chariot wheel, wherein the hub forms the central point, with other smaller airports connected to it through the spoke system. Usually a number of passengers arrive from the other airports to the central hub, where they can then be transferred as per their final destinations. Hub airports form an integral part of the globalising world, as they are preferred by both, the airport operators and the travellers. On one hand, with the high frequency of the aircraft movements airport authorities are able to generate substantial revenues due to the transfers, while on the other hand, the knowledge workers and business travellers acknowledge the accessibility as a result of the global network of the airlines, thus, virtually giving them access to every business location and market around the world (Conventz & Thierstein, 2015a).

With the growing importance towards the knowledge economy, the transfer and movement of the workers who generate and share knowledge becomes even more valued, with the hub airport evolving into a central node of economic activity and high accessibility (Florida, Mellander, & Holgersson, 2014). Various studies have shown the growing number of knowledge-intensive firms that are attracted to the airport location because of the accessibility factor, and this in turn has a significant impact on the spatial development and the economic performance of the region (Bleumink et al., 2006; Conventz, 2010; Conventz & Thierstein, 2015a; Kuipers & Manshanden, 2010; Thierstein & Conventz, 2014). With the growing foreign investments and the international trade flows, the Netherlands forms an important part of the global knowledge network, and Schiphol Amsterdam Airport facilitates such movements while creating a connection between the corporations located in the country and their global counterparts (Bleumink et al., 2006).

Based on these global connections between the knowledge-corporations, Lüthi et al. (2012) mention three phenomena that describe the global network economies:

a. Global sourcing

Porter (2000) mentions that a number of multinational firms strategically develop plans to locate offices in different parts of the world to not only source the local knowledge inputs, which vary highly among different countries, but also to have a better access to the different emerging markets, in order to stay ahead of their competitors.

b. Relational proximity

Due to global sourcing, there is an increased interaction between various actors from different sectors, which develops relational proximity between them. Boschma (2005) refers to this as “organizational” proximity and describes it as the level of relationship that develops either within the same firm or between different firms, which in turn influences the process of knowledge sharing, by controlling uncertainty and opportunism.

c. Global information exchange

With the increased accessibility between different global business locations, especially facilitated by multimodal transportation hubs, the exchange of information brings a large number of suppliers and customers within close “distances” from one another, without actually having been located in the exact same geographical setting (Amin & Cohendet, 2004).

Thus, the interaction between the two external factors 'agglomeration economies' and 'global network economies' shape the way knowledge is exchanged between different firms, considering the fact that they may either be located in the same geographical setting, or in different parts of the world, connected through international transport infrastructures acting as gateways to the region. With over 58,000 transfer passengers each week, of which more than 33% are business related movements, Schiphol Amsterdam Airport is one of the best connected hubs in Europe, with 327 destinations in 98 countries directly connected (Royal Schiphol Group, 2018). Bleumink et al. (2006) state that these factors show that the hub airport, with its international connections, offers a suitable business environment for these firms to locate and execute their business operations. However, they say that this does not apply to all companies to the same extent. Three factors, namely, the type of establishment, whether research, corporate office, or production and distribution centre; the type of work conducted, whether strategic coordination and management, or financial services; and the sector of the company, determine the extent to which it would directly depend on the aviation sector.

2.4 Property portfolio of the knowledge corporations

As mentioned before, along with the external factors that highly influence the flow of knowledge through the airport, the real estate facilities are also equally important for the knowledge-intensive corporations. According to Gibson and Lizieri (1999a), the move from a post-Fordism style of working to the new working approach, that is affected by globalization, the generation and sharing of knowledge, and a move towards innovation, has transformed the type of business spaces utilized by the corporations. With the change in the type of businesses in the knowledge economy, corporations seek innovative property related solutions that grant them a level a flexibility for all divisions of their companies, from the permanent and stable parts to the temporary and volatile businesses in the firm. This idea has been captured by the difference between the core and periphery portfolio, as proposed by Gibson and Lizieri (1999b).

Research has shown that the office portfolio for corporations has seen a significant change over the past few years; with a reduction in the size of the portfolio, the shortening lengths of the lease contracts and a change in the preferred location of the corporate office. These aspects have been characterized by the core-periphery model (as shown in figure 14) which focuses on the type (functional, physical and financial) and the degree of flexibility demands of the particular corporations.

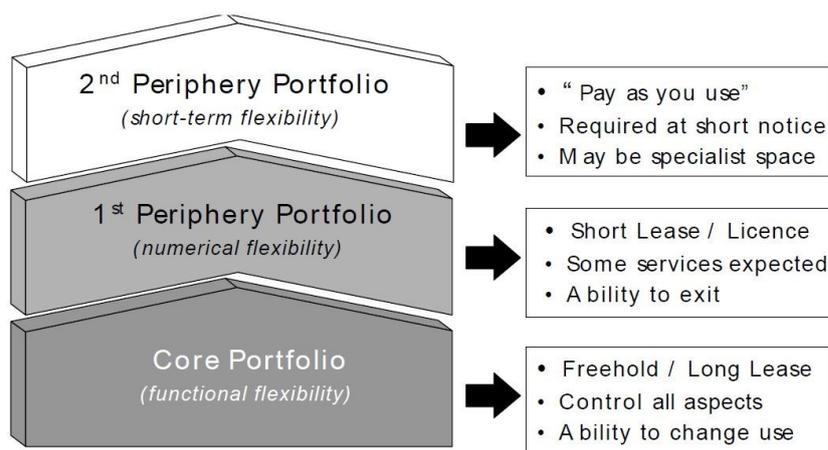


Figure 14. The core and periphery model for the property portfolio of knowledge corporation (Gibson and Lizieri, 1999a)

The core part of the portfolio is usually identified as the most important asset planned for a long term use by the corporation. This consists of headquarter offices or important global offices which are strategically located and house the most important functions with the core employees occupying the particular office space. The corporations usually occupy such spaces on a long-term lease or even full ownership, for maximum control over the property (Gibson and Lizieri, 1999a).

The core portfolio can be seen as supplemented by two other levels of periphery office spaces. The first peripheral spaces is often occupied on a shorter term basis, with a duration of 3-10 years, and commonly consists of temporary branch offices, with the objective of accommodating more employees during the peak demand levels or while expanding for a new service or product bring offered in the market. One of the primary focus is the lease contract offered and the financial exit strategy for the corporation, at the same time if any additional services such as facility maintenance and management is also offered by the supplier. The secondary peripheral spaces are acquired on an extremely short-term basis, for a few days or even hours, and commonly consists of a generic office

space in an area that caters to the short-term requirements of the corporation, for conducting special trainings or meetings. Such office spaces are completely serviced by the supplier and are usually offered on the 'pay as per use' criteria, to attract more corporations to use them (Gibson and Lizieri, 1999a).

The knowledge-intensive corporations that locate at the airport can be seen as dedicating the offices as both, core and peripheral office spaces, with varied space requirements as per their businesses. On one hand, as shown as one of the main functions of the Mainport strategy, number of European headquarters tend to locate around the Schiphol airport, with this forming a part of their core portfolio (Priemus 2001). With a number of knowledge corporations located within close spatial proximity and convenient connections to other business sites around the world as a result of the hub airport function, the office spaces at Schiphol can be seen as occupied on a long term basis with strategic objectives. On the other hand, as proposed by Button et al. (1999), airports facilitate a continuous flow of people and knowledge which presents an opportunity to capture this value and shows a demand for peripheral office spaces. Even with the improvements in the ICT and telecommunications field, the continued demand for face-to-face interactions by the knowledge corporations can be satisfied through peripheral office spaces which can be occupied for a much shorter duration. Although the type of business demands that the respective office spaces at the airport can satisfy highly depends on the corporation itself, it can be seen as an important factor that influences and contributes to the type of real estate developments within the Airport City. This aspect is further explored during the empirical part of the research, wherein the case studies with certain knowledge corporations at Schiphol, help to give an insight into the corporation locating at the airport.

2.5 Connecting the Mainport function and the Knowledge precinct

As seen in the conceptual diagram, the Mainport function and the knowledge precinct form the two main functions for developing the theoretical framework, which forms the base of the entire research. The main aspects of these two phenomena, which have been described previously in figure 5 and figure 12, connect on multiple levels, this forms the theoretical framework that is used to understand Schiphol in the knowledge economy as a new knowledge precinct, and this is illustrated in figure 15. The interaction between these aspects influences the knowledge corporations locating at the Schiphol Airport for the generation and sharing of knowledge, as explained further in this section.

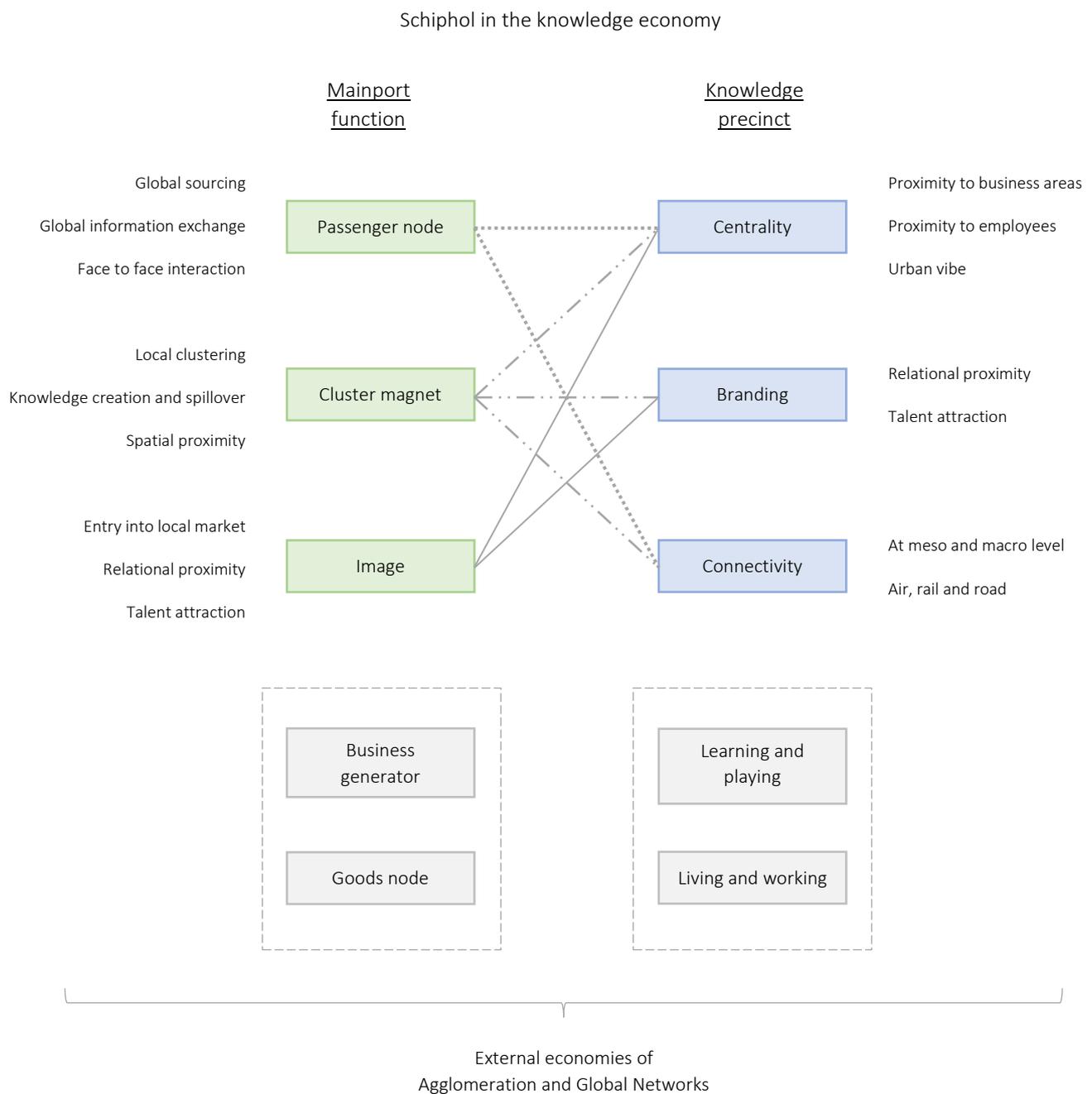


Figure 15. Theoretical framework: illustrating interaction between the knowledge precincts and the Mainport function (own illustration)

As seen in figure 15, the 'passenger node' aspect of the Mainport is directly linked with the 'centrality' and 'connectivity' aspect of the knowledge precinct, wherein a number of corporations prefer Schiphol due to its geographical central location, as well as the connectedness offered with various parts of the country and the world through multiple means- air, rail and road. This leads to a significant flow of passengers through the airport and encourages a global exchange of information while promoting face-to-face interaction. With a large number of European headquarters and branch offices locating at Schiphol, the aspect of a 'cluster magnet' within the Mainport function leads to a notable knowledge creation and spill over, while encouraging spatial proximity within different corporations, this is related to the 'centrality', 'branding' and 'connectivity' aspects of the knowledge precinct where all three play an important role in creating relational proximity with different partners and clients around the world, and offer an additional advantage in the ongoing war for talent. Finally, the 'image' function of the Mainport corresponds to the 'centrality' and the 'branding' aspect of the knowledge precinct, where the reputation and function of Schiphol as an international hub airport contributes to the knowledge economy, while creating an urban vibe in the area for corporations to locate.

At the same time, as highlighted in figure 15 (in grey), there are certain aspects of the Mainport and the knowledge precinct that currently do not fit the profile of Schiphol as the new knowledge precinct. Schiphol as a location has a few limitations due to security and environmental reasons that do not allow the 'living and working' of knowledge workers in the same location. At the same time, although the Mainport being a 'goods node' does attract transport and logistics corporations to the area, it does not significantly contribute to the knowledge economy. It is important to realise that the two phenomena of the knowledge precinct and the Mainport cannot be seen as one leading to the other, but instead as complementing one another and contributing to their developments. The interaction between the two helps to understand the external economies (agglomeration and global network, as shown in figure 13) created in the region, and the role that Schiphol Mainport plays as the new 'airport knowledge precinct'.

As seen from previous research, the airport acts as a catalyst for the knowledge economy by facilitating increased interaction at the local (meso) and the international (macro) level (Droß & Thierstein, 2011; Schaafsma et al. 2008), this highly influences the type of real estate developments in the area (Conventz, 2010; Conventz & Thierstein, 2015a). Along with the accessibility advantages, the real estate that the knowledge firms occupy has increasingly become important in the knowledge generation and sharing process, this includes aspects such as the quality of the office space, the workspace floor plans, and other property related services available (Conventz & Thierstein, 2015b). There is a lack of scientific knowledge in this regard, to understand the real estate strategies and demands of the knowledge corporations in the airport vicinity. This will be explored through the empirical part of the research by selecting knowledge corporations located around Schiphol Airport as case studies, and conducting semi-structured interviews with the office suppliers and the experts from practice to understand their approach towards the subject.

III. Empirical Research

After completing the literature review, the next stage of the thesis involves conducting the empirical research, based on the findings identified from the theoretical framework. The aim of this section is to explain the methodology used to produce data that contributes to the theoretical framework (figure 15), and at the same time helps in the formulation of recommendations for the optimal utilisation of real estate at the Schiphol Airport. The empirical research helps to gain a deeper understanding into the real estate developments in the airport area, and the strategies and demands of the corporations that are located there.

As seen in figure 16, the empirical research is divided into three main sections, first, case studies from the demand side wherein different knowledge corporations located at Schiphol are selected as case studies and a cross-case analysis is produced from their findings, second, semi-structured interviews with the supply side, in that understanding the strategies deployed by the office suppliers at Schiphol, and third, to supplement these findings, semi structured interviews with experts from practice to corroborate the findings from the first two sections, and have an unbiased view. Using a variety of sources helps to create a triangulation technique and have holistic and comprehensive results.

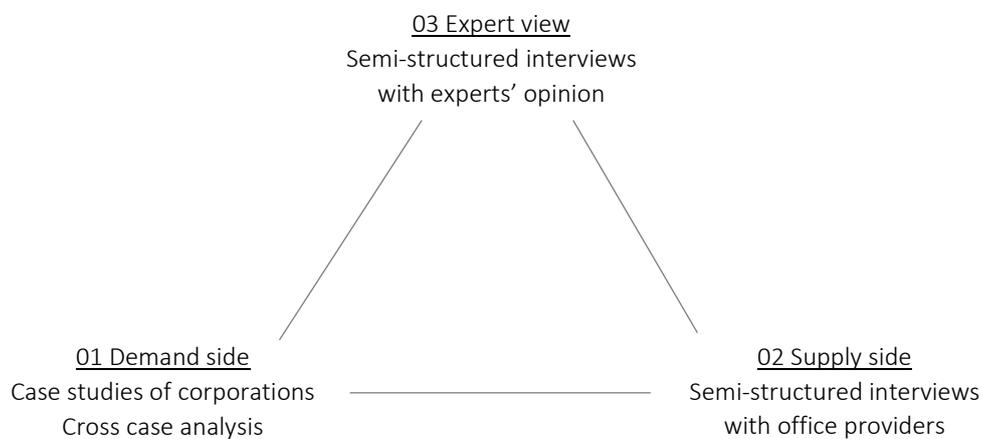


Figure 16. The three steps for the empirical research design (own illustration)

01 Case study (Demand side)

According to Yin (2013), the development of a theoretical base is highly needed and helps to formulate the case study design by identifying concepts from the theoretical framework. A case has been defined as a phenomenon, that occurs in a specific context, wherein the margins between the phenomenon and the case are still unclear, whereas a case study is defined as the empirical method to investigate the case, by addressing the 'how' and 'why' questions, specific to the phenomenon. For this research, while designing the case study, it is important to realise that the empirical data needs to be directly linked with the concepts recognised in the literature review, and then contribute in the final conclusions, i.e., developing the strategical plan for Schiphol.

As per Yin (2013) there are four main ways in which a case study design can be approached, namely, single-case design, single-case embedded design, multiple-case design and multiple-case embedded design. Although a formal approach to the case study design is not entirely compulsory, focusing on one of the above mentioned approaches strengthens the case study and at the same time makes the approach more systematic.

For this research, a multiple-case (holistic) design of case study has been chosen as shown in figure 17, with the aim of collecting highly compelling and robust evidence based on the theoretical framework. While selecting multiple cases, the research is approached with a replication logic, rather than a sampling logic, in that the aim is to collect similar results or contrasting results which can be seen emerging at the time of selecting the cases. The holistic style of design helps to identify similar themes throughout all the selected cases that work within the same context, i.e., the knowledge corporations locating in close proximity to an airport, and their specific demands and strategies, thus giving a more comprehensive idea of the topic being analysed.

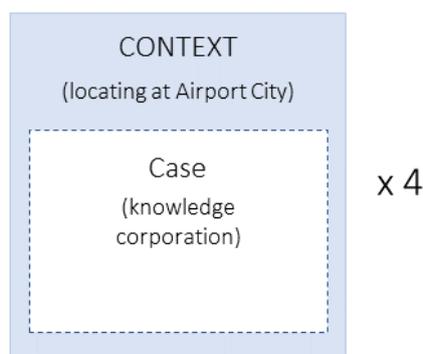


Figure 17. Multiple-case holistic design of case study (own illustration, based on Yin, 2013)

1.1 Case study selection criteria

With the aim of understanding the demand side, i.e., the knowledge corporations within the airport vicinity, data is collected from the different corporations located at Schiphol. A data base of the corporations is created by accessing the list of corporations from the open source VTIS (Vastgoed Transactie Informatie Systeem) and also by consulting Schiphol Real Estate (SRE), and then categorising the corporations as High-Tech Industry or Advanced Producer Services (APS), based on the Standard Business Classification Code (Standaard Bedrijfsindeling) as defined by the Chamber of Commerce, and as seen in Appendix G. Once this data set has been created, the qualitative data is collected from certain corporations that are selected based on the case study selection criteria as shown in Table 2, hence, following the multiple-case holistic design. The case study selection criteria has been mentioned below in more detail:

	Case study selection criteria	Description
1	The corporation is located at Schiphol Amsterdam Airport	As the research focuses on the real estate developments that occur within the airport vicinity, one of the primary selection criteria is that the corporation is located at the Schiphol Airport. The area defined as the Schiphol airport has been classified by the Municipality of Amsterdam and Haarlemmermeer, and also consulted by the Schiphol authorities.
2	The corporation forms part of the knowledge economy, i.e., is a high tech industry or provides advanced producer services	There are a number of companies that exist around the Schiphol Airport, ranging from warehouses and transport facilities, to corporate offices of varying sizes. This research focuses on the emergent knowledge economy and thus, the corporations that are a part of this economy qualify as potential cases for the research.
3	The corporation occupies an office space offered by the Schiphol Group	Within the airport vicinity, not all the office spaces are offered by the airport authorities. There are a number of other investors who supply the office space. For this research, the focus is only on the spaces which are offered by Schiphol.
4	The corporation utilises the multi-modal transportation services offered by Schiphol.	Within the knowledge economy, a company that is either a European headquarter, or is an important branch office of another global corporation is chosen for the research. The knowledge workers from these companies tend to travel often to other business locations for the exchange of knowledge.

Table 2. Case study selection criteria and description (own illustration)

1.2 The selected cases

Based on Figure 17 and Table 2, four cases are selected which represent the views of the demand side. A brief introduction about each of these cases is given below.

A. Microsoft Nederland, Schiphol CBD

Microsoft Nederland is one of the largest multinational technology corporations that started in the USA, and have had a presence in the Schiphol area for almost 15 years now. Their office at Schiphol is the Sales, Services and Marketing office for Microsoft in the Netherlands, which is focused on creating a Customer Hub, with the aim to bring a number of Microsoft customers and partners together. In the same office building, Microsoft has partnered up with Spaces, a Dutch based co-working office provider, to create an inspirational working environment focused on collaboration and the optimisation of space (Interviewee A, personal communication, February 20, 2020; Microsoft, n.d.).

B. Samsung Electronics Benelux, Schiphol CBD

Samsung Electronics is one of the largest multinational electronics corporations, that started in South Korea, and decided to relocate a part of their office from Delft to Schiphol in 2016. This part of the corporation that moved to the Schiphol Airport is the Sales and Marketing organization for consumer products in the Benelux which focuses on selling a variety of electronic products to its customers, whereas the logistics part of the company stayed in Delft. Samsung Electronics are a major office occupier in the CBD area along with Samsung Air Conditioning and DS Smith in the same building (Interviewee B, personal communication, March 10, 2020; Samsung, n.d.).

C. John Laing Group, WTC, Schiphol CBD

John Laing is an investor and manager of infrastructure and renewable energy projects, working under governmental public-private partnerships (PPP), with a focus on the realisation and delivery of transport, environmental and social projects. John Laing is a multinational firm, serving a variety of markets from Europe, North America, Latin America and Asia-Pacific, with their main headquarters in the UK. Being located at World Trade Centre, Schiphol for over 10 years now, the company first moved to the Netherlands to work on a pipeline of PPP projects and serve the Dutch market (Interviewee C, personal communication, March 5, 2020; John Laing Group, n.d.).

D. KLM Digital Studio, Tristar 3, Schiphol East

KLM Digital Studio (DS) is a branch office of the KLM airlines, and works towards digitizing for KLM, in that, they focus on digital transformation, by exploring new technologies such as augmented reality, virtual reality, artificial intelligence and automation. With the digitization program starting in early 2015 in another KLM building, they primarily work for employees of KLM, such as the cabin crew, flight and cabin attendants. In 2016, as the department outgrew its previous office space, they moved to the current location. KLM DS is currently located in Schiphol East, with their operations split between two multi-tenant buildings, Tristar 2 and Tristar 3 (interviewee D, February 20, 2020).

1.3 Case study methods and analysis

Once the multiple case study design has been chosen, it is also important to explain the procedure that is followed to achieve the end results planned for the empirical part. This procedure is described in figure 18, wherein three main steps can be identified.

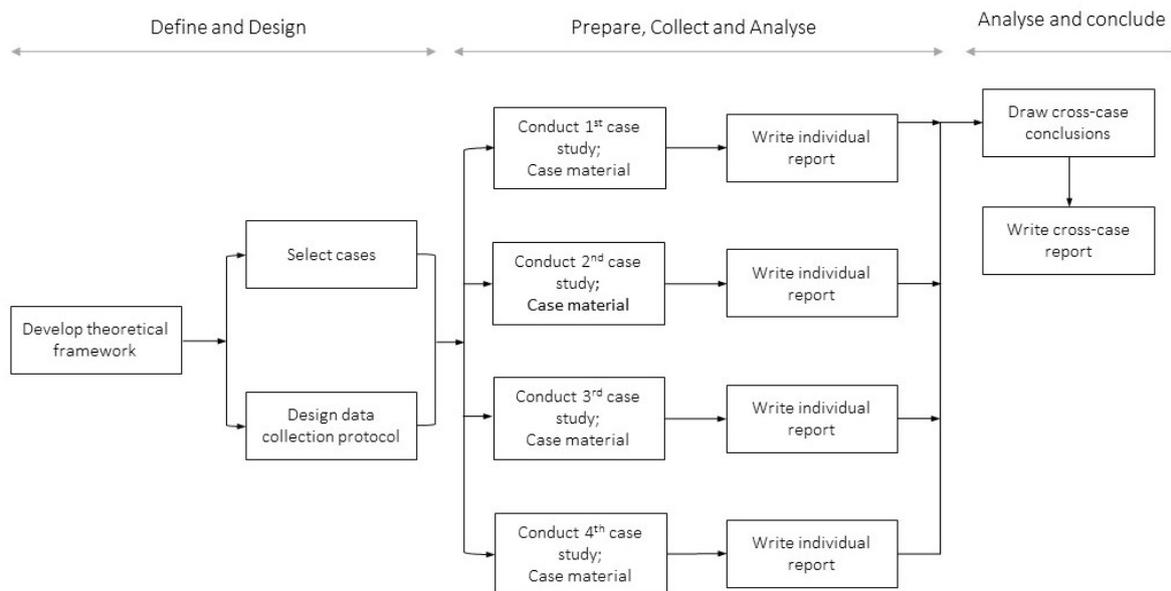


Figure 18. Case study research design (own illustration based on Yin, 2013)

1.3.1. Define and Design

The first step involves developing the theoretical framework, which is a part of the literature review done in the previous sections. Based on the findings from this framework, different cases are selected through a case study selection criteria, as shown previously in section 1.1. This is then followed by designing a data collection protocol known as the interview protocol, which is based around eight main themes identified from the literature review, these themes form the basis for the collection of information from the different cases. With the spatial developments around the airport highly influenced by the spatial demands and strategies of the knowledge intensive companies located there, the case studies aim to understand the choices made by some of these companies. These choices then help to explain the main drivers behind the company decisions, based on which a strategy plan can be formulated. The eight themes have been explained below:

	Theme	Description
1	Nature of work at the corporation	<ul style="list-style-type: none"> - Give an introduction to the corporation - Understand which part of the knowledge economy they qualify for
2	Location decision and motivation for Schiphol	<ul style="list-style-type: none"> - Identify the strengths and weaknesses for the company to locate at Schiphol

3	Accessibility requirements for the company to locate at Schiphol	<ul style="list-style-type: none"> - Understand the dependence of the company on the hub function of Schiphol - Understand the process of exchange of knowledge and how it is implemented by the corporation
4	Face-to-face interaction and relational proximity	<ul style="list-style-type: none"> - Frequency of communication with the other branches of the corporation located far away - Importance of physically meeting other workers to exchange knowledge and the spatial need for this
5	Spatial proximity to other firms	<ul style="list-style-type: none"> - Understand the role, if any, that other knowledge firms located at Schiphol play for the development of the company - Demand and strategies to increase interaction with these firms
6	Core-periphery portfolio	<ul style="list-style-type: none"> - Understand in which category the current office is classified - Comprehend which portfolio strategy can benefit the most from the airport location
7	Other push and pull factors	<ul style="list-style-type: none"> - Analyse how the current facilities offered at the airport influence corporations to locate there - Any additional factors affecting the location for knowledge corporations at the airport
8	Long term plans with respect to Schiphol as a business location	<ul style="list-style-type: none"> - Understand if future expansion plans for the company include Schiphol or other airports as office locations - Have an idea of where the particular industry is moving with respect to the office being located at the airport

Table 3. Themes and their descriptions for conducting the case studies (own illustration)

1.3.2. Prepare, Collect and Analyse

The second step consists of conducting the case studies, and writing an individual study report for each of them, while analysing the findings from the cases. A qualitative approach is taken to collect the data from the corporations in the form of semi-structured interviews to understand the motivation behind Schiphol as a business location, the advantages and the challenges faced. This format is deemed suitable for the process, as the aim is to gain a deeper insight into the subject. Through this approach, the interviewer has a specific set of questions to ask to all the interviewees based on the identified themes (in table 3), and also has the chance to alter some of the questions or phrase new ones during the interview Bryman (2016). An interview guide called an interview protocol is created for this phase of the process (as shown in Appendix B).

Once the interviews are conducted, each of them are transcribed and the recordings are deleted to maintain the privacy of the interviewees. To analyse the case studies, a coding technique is used and helps to gain an overview of the findings based on the themes identified for the empirical research. Each of the themes have a specific code assigned to them, with certain sub-codes, which creates a network of codes and helps in the analysis of the documents. The transcriptions are uploaded on an online platform called ATLAS.ti Cloud, a software used for the analysis of the empirical data from the interviews. Because this research deals with qualitative data and not with statistical research, certain tools can be used to support the analysis process, as also highlighted by Yin (2013), as long as the researcher knows what to look for. While using the ATLAS.ti Cloud tool, the findings from all the case studies are compared together, by selecting a specific code, and thus having an overall view of the particular theme assigned to that code and its sub-codes. Based on the recurrence of the codes and sub-codes, while using the software, it becomes clear that certain themes are more dominant than others, and there are few new ones that emerge as a result of the analysis, these have been highlighted in figure 19. An overview of these codes,

along with their sub-codes has been shown in figure 19, and illustrates the focus on this research, i.e., the locational and real estate aspects of the office location at Schiphol.

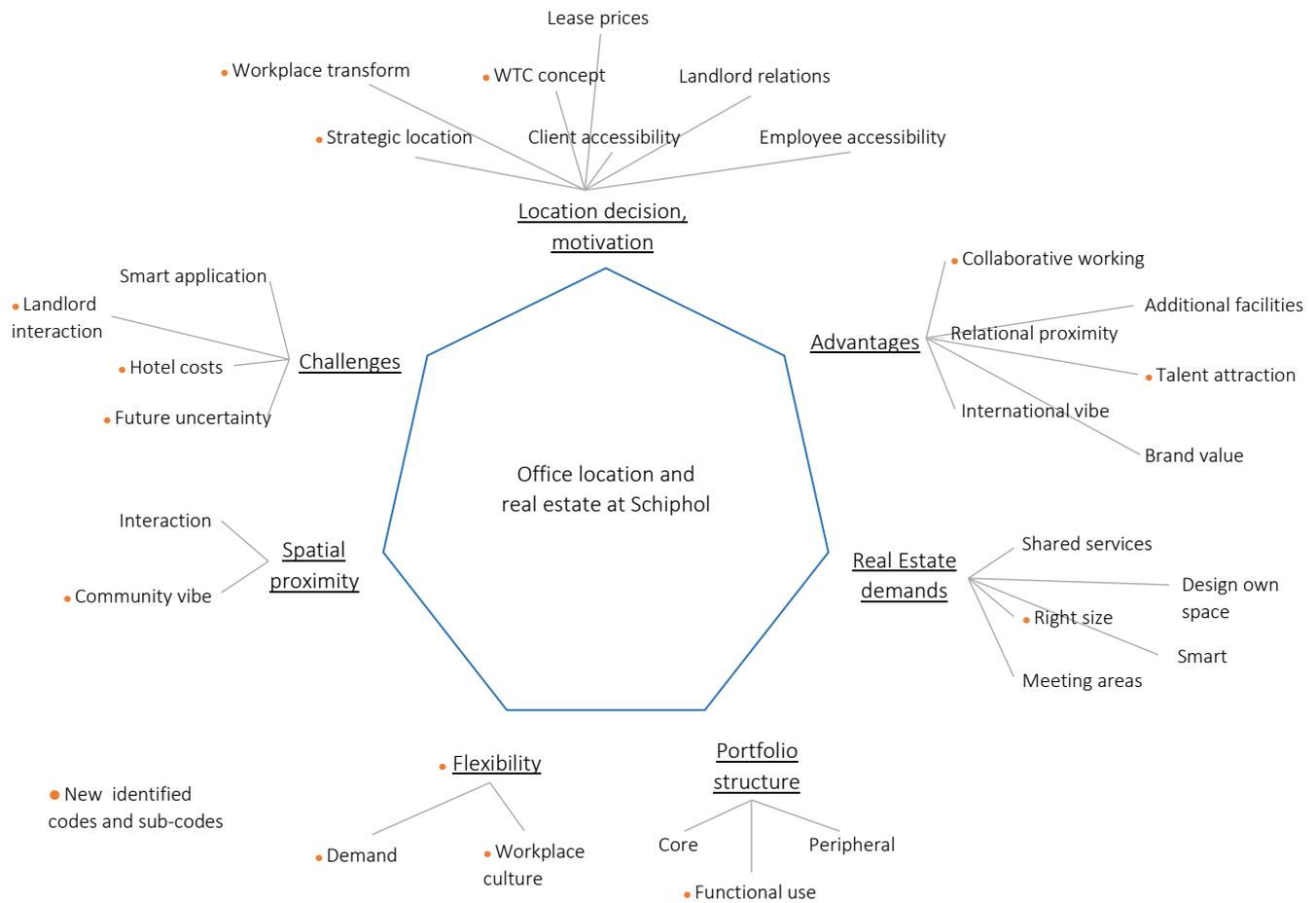


Figure 19. The codes and sub-codes used in ATLAS.ti for qualitative analysis (own illustration)

1.3.3 Analyse and Conclude

The final step is described a cross-case analysis in which the findings from the cases are based on the codes created in ATLAS.ti Cloud. The software allows for filtering each of the codes, showing the respective quotations from all the interviews in a single view, thus making the comparison between the findings convenient. A final cross-case report is created which shows a combined set of findings and the emerging patterns from the demand side, i.e., the companies that locate at the airport.

02 Semi structured interviews (Supply side)

In order to complement the findings from the demand side, the second part of the empirical research consists of conducting semi-structured interviews with the office suppliers at the Schiphol Airport. Following the qualitative research design, these interviews are open-ended and are created with the aim of understanding the point of view of the interviewee (Bryman, 2016).

2.1 The selected interviewees

Three interviews are conducted with the corporations from the supply side, this includes two interviews with Schiphol Real Estate which is the primary office developer at the airport, and one with a co-working provider in the area.

E. Co-working provider

Provider E is an Amsterdam based office space provider that focuses on providing co-working memberships, dedicated desks, office spaces and meeting rooms, while creating dynamic workplaces. In 2018, this co-working provider entered into a partnership with one of the largest tenants at Schiphol and they work towards creating an environment focused on digital transformation while working with data-based solutions, cloud services and artificial intelligence (interviewee F, February 28, 2020; case material).

F. Schiphol Real Estate

Schiphol Real Estate is a 100% subsidiary company of the Royal Schiphol Group, and is involved in the investment, management and development of commercial real estate properties at the Schiphol Airport. The commercial office spaces offered by SRE are primarily focused in two areas, the Schiphol CBD, which works as the dynamic centre and caters to a number of global corporations, and Schiphol East, which is connected to the airports terminals by efficient public transport and caters to companies with less intensive travel demands (interviewee E, March 24, 2020; Schiphol Real Estate, n.d. -a).

2.2 Interview methods and analysis

The interviews are based on the eight themes which were identified from the literature review and have been explained previously in detail in table 3. Using the same themes for these interviews, as used to analyse the case studies, helps to have a complementary insight from the supply side and helps to understand the spatial and real estate strategies currently implemented to cater to the demand of offices at the airport. Some of the questions were also based on the initial findings from the case studies and at the same time, following the semi-structured format of the interview, there was scope to modify the questions based on the responses of the interviewees, this helped to better understand their standpoint on the topic.

Once the interviews are conducted, each of them are transcribed and the recordings are deleted to maintain the privacy of the interviewees. The transcriptions are then uploaded on the online platform ATLAS.ti Cloud, to analyse these interview qualitatively and the same codes created previously for the case studies (as shown in figure 19), are assigned to the quotations by the interviewees, to have a qualitative insight into the supply side. Using the same codes and sub-codes helps to compare the findings from these interviews respectively with the demand side.

03 Semi structured interviews (Expert opinion)

Finally, a third set of interviews are conducted with experts from practice, firstly, with an expert that has been involved in a number of office transactions, especially in the Schiphol area and secondly, two more experts who have been working in the research field of Airport Cities across the world. These interviews are used as triangulation technique with the aim to corroborate the findings from the first two parts of the empirical research. The triangulation technique is often used in qualitative data analysis to increase the validity or to gain a different perspective on the topic being researched, through various sources such as individual interviews, thus giving a deeper insight into the subject matter (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014).

3.1 The selected interviewees

Three interviews are conducted with the experts, the first interview was conducted with a senior consultant, and the other two were conducted with researchers in the field of Airport Cities around the world.

Interviewee H

This expert is a senior advisor who works at one of the leading multinational real estate companies around the world, and provides a number of related services such as management and investment consultancies. The particular expert that took part in this research, has been involved in a number of office transactions not only in the Schiphol area, but also the surrounding areas such as Hoofddorp and Zuidas. Over the years, the individual has maintained close ties with Schiphol Real Estate as well. Due to privacy reasons, the aforementioned participant has been kept anonymous and will be referred to as Interviewee H for the rest of the report.

Max Hirsh, Airport Urbanism

Max Hirsh (PhD, Harvard), a professor at the University of Hong Kong and the CEO of Urban Experts, is a renowned researcher in the field of airports and urban development. As the author of Airport Urbanism (AU), which is a pioneering research on airports and the aviation industry and is based on more than 50 airports around the world and conducted over a period of 10 years, Max is involved in a number of studies and consultancy services and has also delivered numerous key note speeches. Airport Urbanism is a people centred approach towards the designing of airports and development of the airport urban area. AU works on developing strategies for the airports and the cities that they serve, aiming at long-term gains for the parties involved, with a special focus on the people who use these spaces (Hirsh, n.d.).

Pieter Van der Horst, AIREA

Pieter Van der Horst, the Managing Director at AIREA Airport City Development and the Cofounder of the Airport City Academy, is an expert in the field of Airport City developments, non-aviation related revenues, economic development, strategy development and numerous other fields. Prior to this, Pieter worked at Schiphol Real Estate for over 10 years, and acted as the Area and Project Director being responsible for the real estate developments and their delivery especially in the Schiphol CBD area. AIREA is a leading consultancy firm in the field of Airport Cities, landside developments and real estate at the airport and also other Transit Oriented Development with a high flow of traffic. The company helps airports in developing overall strategies, while working in tandem with their local municipalities and contributing to the regional economic development (Van der Horst, n.d.; Airea, n.d.).

Max Hirsh and Pieter Van der Horst co-wrote an article 'How Can Airports Develop Their Landside Real Estate?' that focuses on the real estate strategies and approaches that airports around the world can follow.

3.2 Interview methods and analysis

These interviews are mainly based on the findings from the previous two sections, i.e., the demand and the supply side, while the questions for the interviews are based on the previously identified eight themes (as seen in table 3). With the aim of having a deeper understanding of the topic, it is important to conduct the interviews along the same lines as the previous sections, while following the semi-structured format as well.

After the interviews are conducted, they are transcribed and the recordings are deleted to maintain the privacy of the interviewees. These transcriptions are also uploaded on the online platform ATLAS.ti Cloud, and to analyse the findings, the same codes and sub-codes created previously (as seen in figure 19), are used in this section also to ensure the convergence of multiple sources regarding the topic.

Lastly, a report is created highlighting the findings from the experts opinions and based on the patterns, insights and opportunities that emerge from the findings of these interviews, a final strategic plan will be proposed for an optimal utilization of the real estate at Schiphol.

04 Ethical deliberation

According to Bryman (2016), a qualitative research involves a number of ethical considerations, that need to be addressed throughout the course of the study to ensure the integrity. The above mentioned data collection methodologies help to provide an understanding of the planning and the implementation processes of the subjects involved and gives an insight into their decision making procedures. At the same time, it is also important to consider that there are few ethical considerations involved in this type of research, where inputs from external subjects need to be interpreted and analysed.

Diener and Crandall (as cited in Bryman, 2016), mention four ethical principles that need to be considered while conducting a qualitative research, namely:

- Harm to participants: the research should not cause any kind of harm to the participants in the research, physical, emotional, stress or a threat to the reputation of the individual or the corporation he/ she represents.
- Lack of informed consent: the participants should be well informed about the process, to ensure that they make an informed decision about taking part in the research, conducting covert observations is highly discouraged.
- Invasion of privacy: this principle goes a step beyond the concept of an informed consent and focuses on maintaining the confidentiality of the research participants through the process.
- Deception: the data collected and analysed by the researcher should not be biased and influenced by personal interpretations, this can compromise the authenticity of the data, thus deeming the research not valid.

Along with following the ethical considerations while conducting the research, it is also important that the final research findings are available for future researchers and other literary audiences, thus according to the FAIR principles (Findability, Accessibility, Interoperability and Reusability), the final research paper will be uploaded in the Educational Repository of TU Delft (Wilkinson et al., 2016).

05 Knowledge corporations at Schiphol

As a first step to understanding the current demands of the corporations located at Schiphol, Figure 20 shows the overall map of the airport, in which the two main areas, Schiphol CBD and Schiphol East, where most of the commercial office real estate is concentrated within the airport premises. These two areas form the two major sub-markets within the Schiphol area, and are characterised by a number of factors, such as the distance to the airport terminal, occupancy rates, rental prices, the construction activity and available square footage in the buildings in the areas. These factors influence the demands and the type of tenants that occupy the offices in both the sub-markets and the quality of office space that is offered.

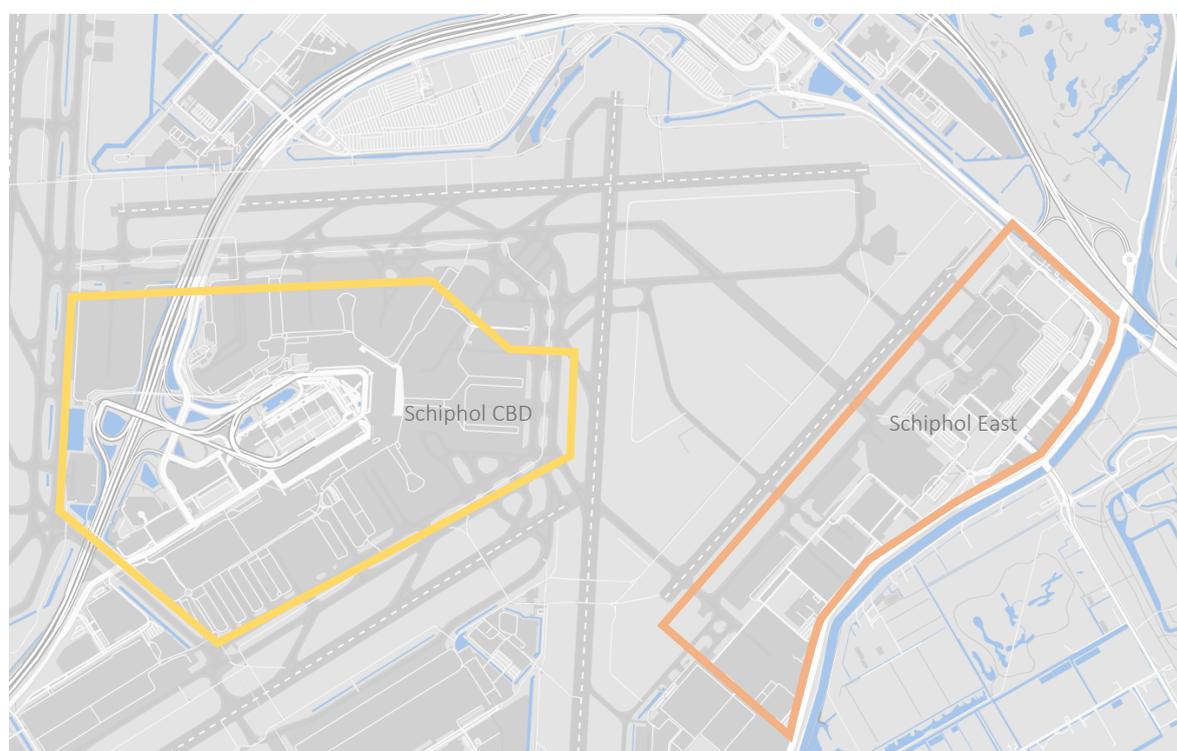


Figure 20. Overall map of the Schiphol Airport (own illustration)

To give an overview of the commercial real estate in the Schiphol CBD and Schiphol East, tables 4 and 5 represent the office buildings in those areas respectively. Other information such as the construction year, number of registered tenants in the building, the minimum and maximum office area occupied by a single tenant* and the distance to the Schiphol Plaza (shown in minutes by public transport), is also displayed with respect to each building. This information is retrieved from the national database Basisregistraties Adressen en Gebouwen (BAG) (*Basic Registration of Addresses and Buildings* in English). A detailed map of both the areas, with the respective buildings numbers mentioned in tables 4 and 5, can be found in Appendix F. It is also important to mention that these building number have been allotted by the researcher as per the scope of the research, and have not been specified by Schiphol or by BAG.

Reference	Construction year	No. of tenants	Min_surface* (m ²)	Max_surface* (m ²)	Distance to Schiphol Plaza (minutes)
Building 1	2007	1	-	16.800	8
Building 2	2008	12	509	11.834	5
Building 3	2006	17	11	1.039	6
Building 4	2019	1	-	10.398	8
Building 5	1999	70	26	36.645	8
Building 6	2001	199	24	8.570	2

Table 4. Office buildings in Schiphol CBD (Kadaster, n.d.)

Reference	Construction year	No. of tenants	Min_surface* (m ²)	Max_surface* (m ²)	Distance to Schiphol Plaza (minutes)
Building 1	1999	1	-	1.100	15
Building 2	1999	1	-	2.211	15
Building 3	2003	26	145	214	15
Building 4	2000	19	134	492	14
Building 5	1998	87	21	201	15
Building 6	1987	1	-	2.180	21
Building 7	1999	1	-	1400	21
Building 8	2001	30	234	412	23
Building 9	1998	1	-	2.982	21
Building 10	2002	1	-	15.100	22

Table 5. Office buildings in Schiphol East (Kadaster, n.d.)

As this research focuses on the knowledge corporations at the airport, it is important to show a representative map of the corporations at Schiphol, a one-to-one dot density map has been used, wherein each dot represents a single corporation, showing its location on the map. For this purpose, an online geo-coding platform called BatchGeo is used, in which the street address and the names of the companies were used as inputs to generate an output map with the exact location specified. Figures 21 and 22 represent Schiphol CBD and Schiphol East respectively, and by differentiating the corporations based on the sector of knowledge economy that they belong to, it becomes clear that most 'Advanced Producer Service (APS)' companies have their headquarters or one of the global head offices at Schiphol, whereas the 'High-Tech' companies are usually branch offices. Also, a higher proportion of service producing corporations are located in the Schiphol CBD, and a higher proportion of high tech corporations in Schiphol East.

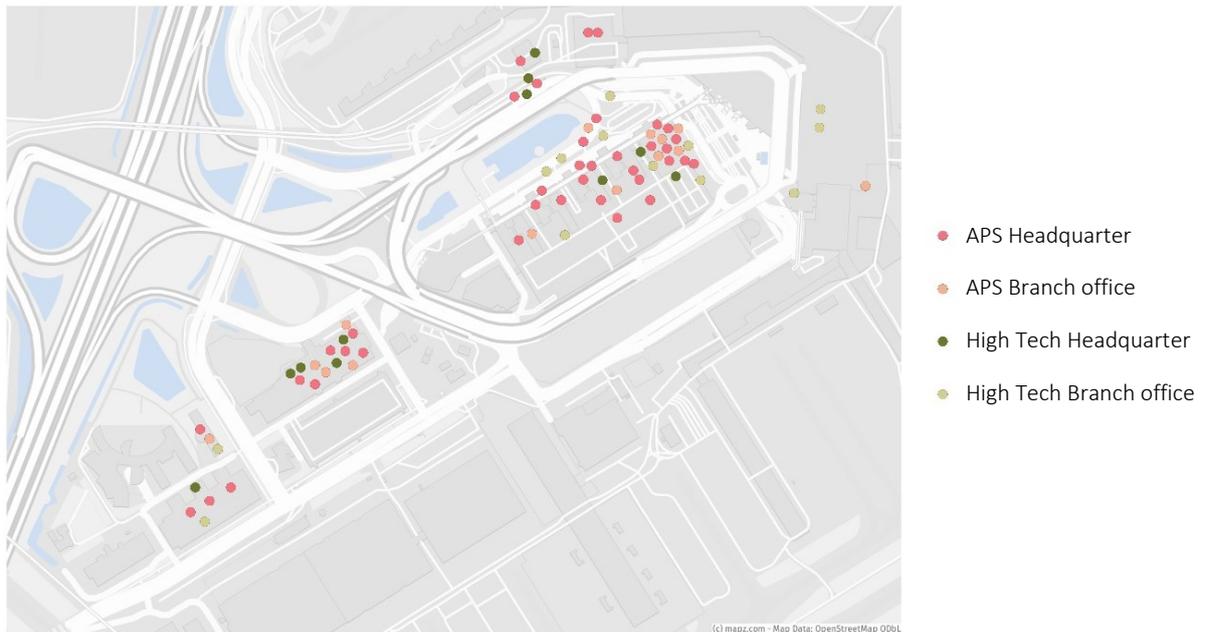


Figure 21. Knowledge corporations in Schiphol CBD (own illustration)

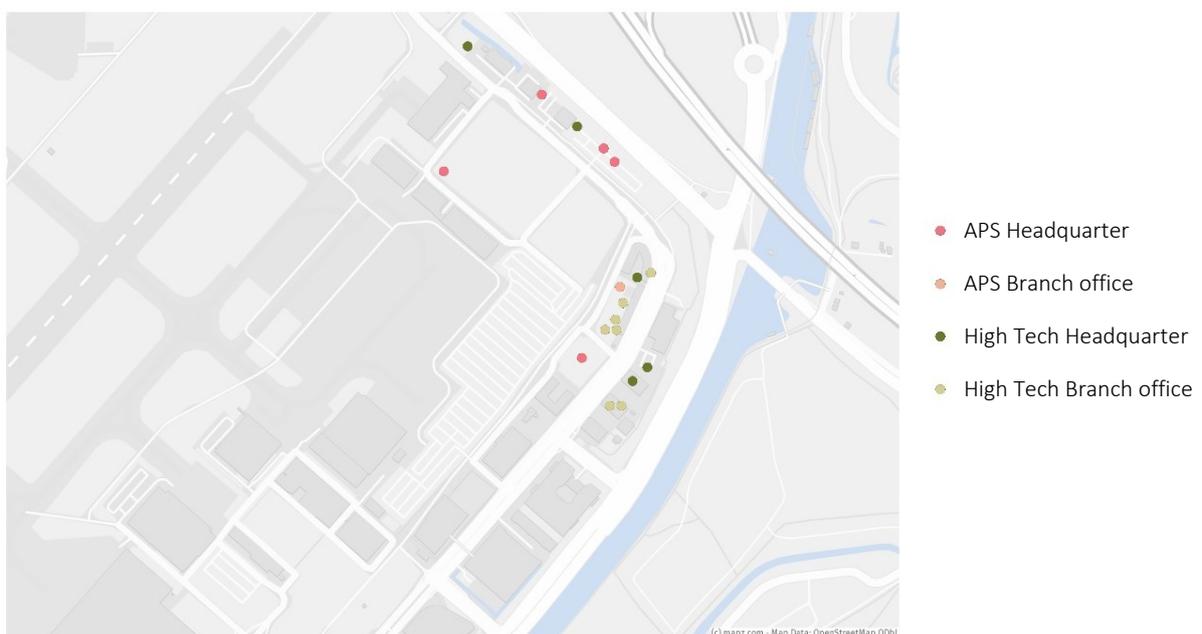


Figure 22. Knowledge corporations in Schiphol East (own illustration)

Also, a detailed inventory of all the corporations at Schiphol that are a part of the knowledge economy has been created (which can be found in Appendix G), while classifying them into sub-categories within the knowledge economy. These sub-categories have been defined as per the Standard Business Classification Code (Standaard Bedrijfsindeling) as defined by the Chamber of Commerce. Accordingly, figures 23 and 24 represent these corporations in the Schiphol CBD divided as per the APS and High Tech sector, respectively. The online geo-coding software, BatchGeo, was used to generate these maps as well, and each colour illustrates the different sub-categories of the knowledge economy.

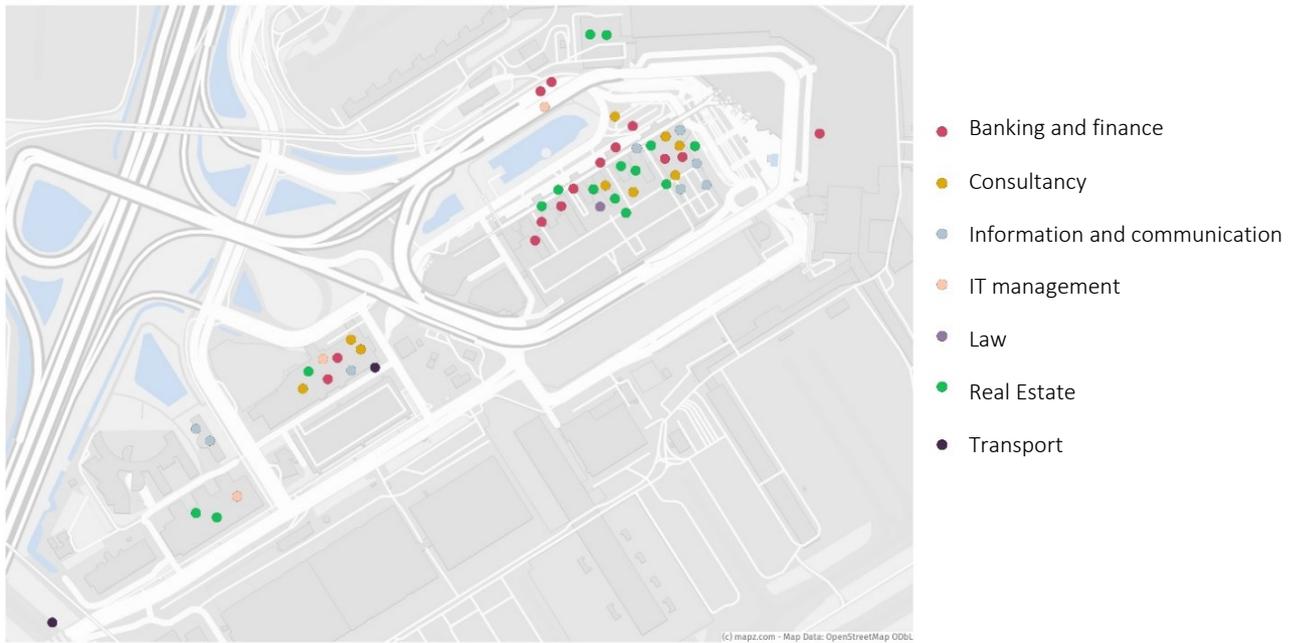


Figure 23. Types of APS corporations in Schiphol CBD (own illustration)

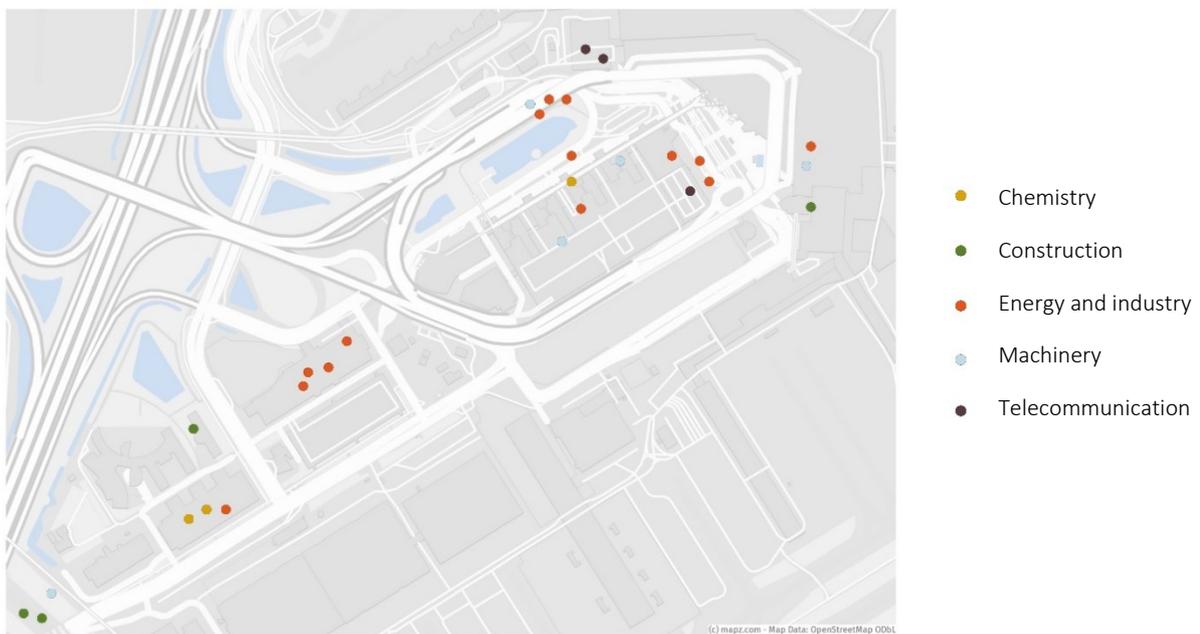


Figure 24. Types of High-Tech corporations in Schiphol CBD (own illustration)

Finally, figures 25 and 26 represent the nationality of the companies by differentiating them into Dutch and international companies located in Schiphol CBD and Schiphol East respectively. While these figures show a healthy mix of both local and international companies at Schiphol, it becomes clear that there is a higher proportion of international companies at the Schiphol CBD and a higher proportion of Dutch companies at Schiphol East.



Figure 25. Dutch and international companies located in Schiphol CBD (own illustration)

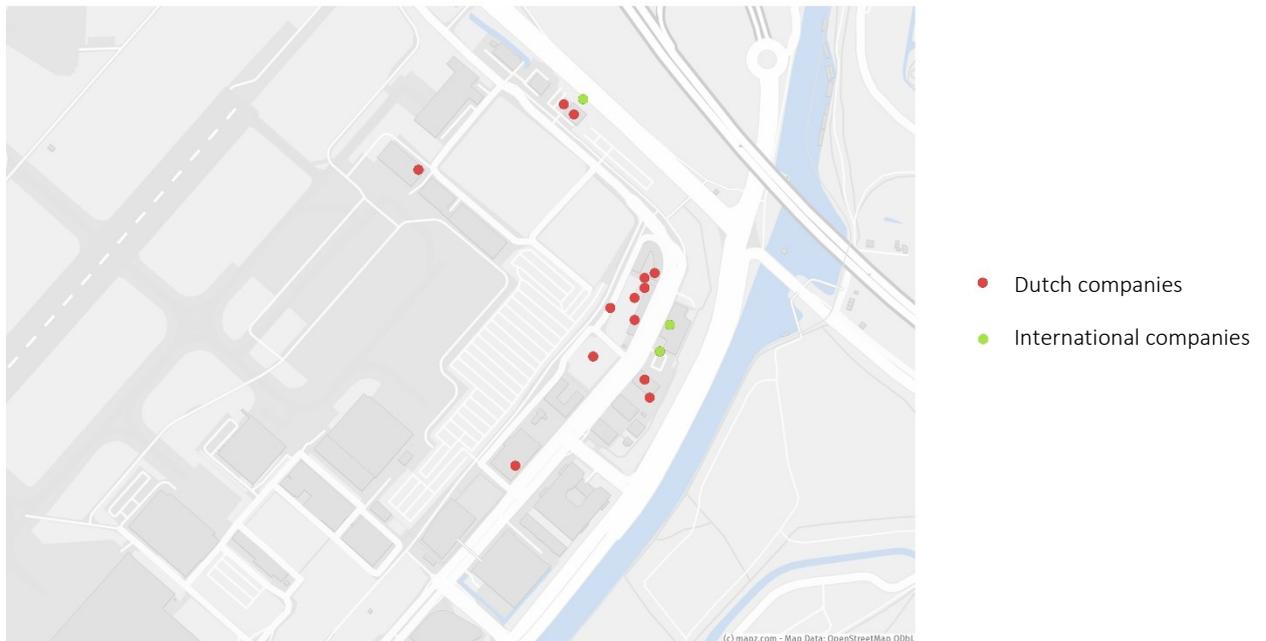


Figure 26. Dutch and international companies located in Schiphol East (own illustration)

Conclusions

Based on the maps created, certain observations can be made which represent the development of the Airport city and the knowledge corporations that form a part of it at the Schiphol Airport. There is a significantly higher number of companies located at the Schiphol CBD, compared to Schiphol East, thus showing a clear difference in the demand for the location. At the same time, there is a higher proportion of the headquarters of service providing firms in the CBD area and a higher proportion of the branch offices for the high tech companies in the East. From figures 23 and 24, it becomes clear that there is an even mix of the types of APS and High Tech industry corporations at Schiphol, and no evident specification for the different sub-categories within the knowledge economy. And finally, while the distribution of local and international companies at Schiphol is quite equal, there is a higher proportion of the international firms at the Schiphol CBD and that of the Dutch companies at Schiphol East. This is indicative of the travel demands of these corporations and dependent on the market that these particular offices serve.

IV. Empirical Results

01 Case Studies

This section covers the main findings from the case studies that have been selected on the basis of the case study selection criteria in Table 2, with the cases being briefly described in section 1.2, 'The selected cases'. The findings from the interviews are based on the eight themes identified in the previous section, and the main findings from each of these cases are thus presented ahead.

Case A. Microsoft, Schiphol CBD

Nature of work at the company

The Microsoft office at Schiphol CBD serves as the Sales, Services and Marketing office for the Netherlands, and works as a customer hub where the nature of the work can be described as belonging to the Advanced Producer Services (APS) sector of the knowledge economy. At this office, the company aims to bring together a number of Microsoft partners and customers, to increase the interaction between them, co-create in the building and accelerate innovation.

Location decision and motivation

Microsoft has been located at Schiphol for over 15 years now, with Schiphol being the preferred location over other nearby options such as Hoofddorp and Zuidas because of a number of reasons. Firstly, mobility is the primary reason for the choice with Schiphol being highly accessible from all parts of the country through rail and road, which meant the ease of access to its employees and other domestic customers. At the same time, being an international company, there are a number of employees who fly in and out of the country on a regular basis and the office location at Schiphol provides a direct access to the terminal.

Secondly, Microsoft also had the freedom to re-design and innovate their workplace, and could easily adopt the growing trend of digital transformation at the same office, which was a preferred option over waiting for the lease contract to end, moving to a new location and then adopting the digitisation of the office space. This aligned with the culture and the working style at the company which focuses on the team collaboration and innovation. At the same time, the relationship between Microsoft and Schiphol also played a major role in making this decision and the idea of digital transformation coincided with the ambition of Schiphol for a Smart Airport City.

Finally, the lease contracts also played an important role in the decision, as moving the office to Zuidas would increase the rent levels two or three fold, giving a wrong impression to the clients. The mobility offered at Zuidas could not be compared with Schiphol, and finally these were the main factors that influenced the location decision to stay at Schiphol. Along these lines the interviewee stated that

"I think Schiphol was also looking at Microsoft to attract other customers through them. And in the last cycle, we decided to stay here. We looked at alternatives at Zuidas, Hoofddorp, The Base D, which is now Heineken. And we decided to stay for a couple of reasons. First we want to stay here because of the mobility of people, as one. We are an international company so close to an airport makes sense for mostly employees. So that was one dimension. The second is we were able to innovate our workplace quicker. Otherwise we had to wait till the lease contract would fully expire and then do the innovation in a new building whatsoever. So we wanted to innovate quicker because there was a market demand we saw and we had to keep up with the trends of digital transformation. And thirdly I think the relationship we have with Schiphol and their ambitions to also be the smart city airport."

*"Of course, there is the CFO also looking over your shoulder and we had a very good deal here. And if you if we would go five kilometres more to the Zuidas, lease prices would double/ triple. Mobility was a disaster. They're going to bring the A10 and the highway into the ground. So this is a good place."
(Interviewee A, personal communication, February 20, 2020)*

Advantages

There are certain added advantages that Microsoft as a company experienced, with a shift in the organisational boundaries, from individual productivity to a more collaborative way of working with its partners and customers, wherein a number of them had the increased ease of access to the office location at the airport.

Real Estate demands

Microsoft entered into a partnership with Spaces, an Amsterdam based co-working office provider, for a better optimisation of the available space and to move towards the digital transformation of the office. In doing so, Microsoft was able to right-size their office space, reducing it from 11,500 m² to 8,500 m², and using the common facilities provided by Schiphol. With efficient connections to different parts of Europe, some of the office space which was previously dedicated for use by employees from other branches, was not needed on a permanent basis, and thus, by entering into a partnership with Spaces, those could be used more effectively. Along these lines, the interviewee stated that

“We are a sort of an international hub for Microsoft, although in the beginning, at the sixth floor which is not available for Microsoft anymore, was the sort of European hub, our European organization also paid for the lease of that specific part. We gave up on that part because we are part of a Western European organization which has easy connections across 13-14 countries.”

(Interviewee A, personal communication, February 20, 2020)

With a focus on the collaborative style of working, there was a need for a large number of meeting areas, conference areas and customer hubs to accelerate innovation and these areas was increased from 2,000 m² to about 6.000 m², and reducing the space dedicated for the employees from 9,000 m² to about 2,500 m². With the use of smart buildings applications, Microsoft is further able to optimise the use of space by monitoring the occupancy rates, the use of energy, the air quality levels, etc.

Portfolio Structure

This office is categorised in the core part of the portfolio for Microsoft, in that it has been acquired for a long-term use by the corporation and acts as an important global office. The office occupies a strategic location, and houses the sales and marketing functions for the Netherlands.

Although the office has been categorised as a core building, because of its locational advantages, it has a different functional use for different employees. On one hand, the building acts as a permanent office mainly for the employees who serve the local Dutch market, on the other hand, the building serves the purpose of a satellite office for the more mobile employees who serve the international market and travel from other branch offices. This lets the company accommodate a floating population within the office with different employees using the office space based on their specific needs and demands. This is illustrated by the interviewee as

“I think it's both. It's core for the people that mainly serves the Dutch market. There are other buildings and we enable them to work at Spaces and partner hubs, etc. with our way of working philosophy and provided technology. At the same time, I think it's a peripheral hub for our RG's, Regional Guests, who have Amsterdam or another city as their main workstation. They travel a lot. So for them also it is perfect because it's close to the airport.”

“As I said, it serves both of our employees. But, I think mostly people that work internationally, so then peripheral portfolio. And I would say if you only serve the Dutch market then it's more a core function of OK”

(Interviewee A, personal communication, February 20, 2020)

Flexibility

Within the company culture, Microsoft focuses on the idea of flexibility for the corporation and its employees, and one of the main aspects that helped them achieve this was the partnership with the co-working provider Spaces. This partnership enables the employees not only to have a flexible work environment within the building, but also gives them the option to work from multiple office locations offered by Spaces. The concept of flexibility is new, which was not a part of the theoretical framework and the interview protocol, but emerged as an important topic during the interview, and as one of the core beliefs of the company. The interviewee states that

“And we're also looking into flexibility. So if I think if each company is looking at optimizing their utilization. And for us, it doesn't need to be in this building. So many employees especially when they do focus work or can work from home, can work at other Spaces locations in the Netherlands. We also enforce Microsoft employees to work on partner sites, customer sites. It doesn't need to happen here.

And I think we are also relatively flexible from a T & E, Travel and Expense policy, to book a meeting room on a group basis or elsewhere so that the Spacemaker initiative from Spaces is an attempt to create more flexibility in real estate. And we have a few meeting rooms here that would work well with the Spacemaker, but it's not being used in an optimized way. Those are flexible approaches we need.”
(Interviewee A, personal communication, February 20, 2020)

Spatial proximity to other corporations

Microsoft does not have any significant interactions with other companies located in the area, other than Schiphol Real Estate and the Hilton Hotel, which is a contrasting finding from the literature review in which the spatial proximity and interaction with other corporations is defined as one of the core concepts for a knowledge precinct to exist.

Challenges

The main challenge that Microsoft faced was the conversion of an existing building into a smart building and to deploy the digital transformation measures. Although this process can bring in certain obstacles with the building maintenance systems, the aim was to set an example for other building transformations, and help Schiphol achieve its ambition of a smart Airport City.

Another challenge that Microsoft faced is that the hotel accommodations offered at Schiphol are comparatively higher than those offered in some other cities in Europe, which has led to some of the international level meetings and trainings to be organised in those cities.

Opportunities

Throughout the interview, there were a number of talking points mentioned by the interviewee which display potential and present opportunities for Schiphol Real Estate to cater to the demand of corporations in the future. Firstly, flexibility is one of the key components that corporations are looking for in the office space. Offering financial flexibility could potentially attract more companies to have their office at Schiphol, although the amount of space used by the companies might reduce, the value of the square meters increases with companies willing to pay more for the financially flexible options. At the same time, not only financial flexibility, but also flexibility in the amount of space and the functional use of the space is considered highly important for corporations. Focusing on these aspects, can help to attract more tenants and utilise the space in an optimal manner.

Secondly, offering a variety of shared services such as restaurants and other concierge services outside the leased office space for all types of corporations, and also communicating them well with the tenants is highly important.

And thirdly, focusing on smart building systems at the building and the area level, can help in further optimisation of space by Schiphol and its tenants. In this aspect, the participant states that

“[...]with respect to lease. I think Schiphol could benefit from helping customers optimize the utilization of their square meter. One, by offering shared services outside the rental lease square meters which are progressing on, and second is also with the smart building efforts that help to optimize the square meters within a building. That should benefit Schiphol for the long term. Even though customers might reduce the amount of square meters. But maybe more customers would be willing to pay for those, or value per square meter would go up.”
 (Interviewee A, personal communication, February 20, 2020)

Conclusion

From the analysis of the case, it becomes clear that Microsoft’s decision to locate and to stay the Schiphol Airport was a strategic one, in which accessibility to the market and for its employees was one of the major driving forces, this aligned with Microsoft’s culture of collaborative working. Partnering up with Spaces also helped the company meet the flexibility ambitions and also gave them the freedom to work from multiple locations. Microsoft advocated for the implementation of smart tools in the building to further help in the optimised use of space, and this was in line with Schiphol’s ambition to move towards a Smart AirportCity. Finally, this office works as a core office for the company, although with its location, it is able to serve a large floating population of employees, wherein it serves the purpose of a satellite office for a number of mobile workers. Figure 27 shows these aspects, under the theme of ‘Airport Office location’, working in the theoretical framework developed previously in figure 15.

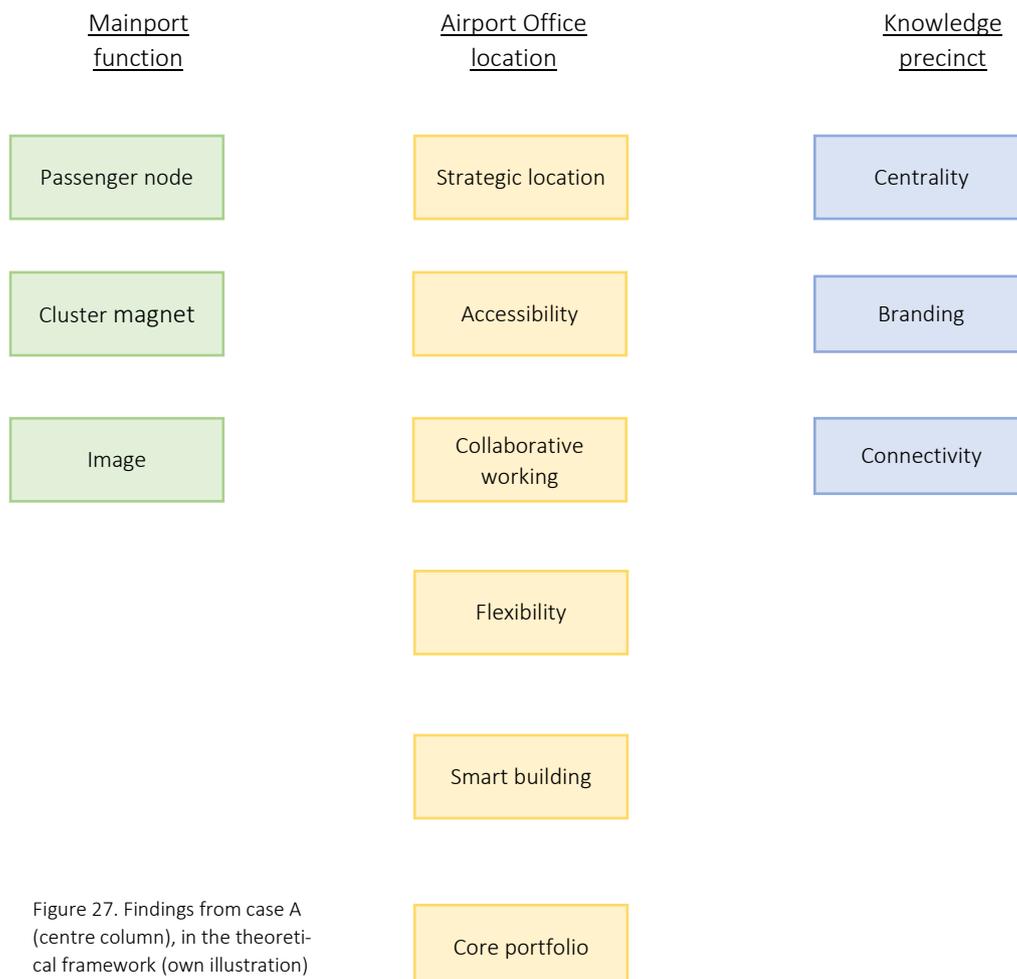


Figure 27. Findings from case A (centre column), in the theoretical framework (own illustration)

Case B. Samsung, Schiphol CBD

Nature of work at the company

The Samsung office at Schiphol CBD serves as the Sales and Marketing office for Samsung Electronics in the Benelux area, wherein the nature of the work belongs to the Advanced Producer Services (APS) sector of the knowledge economy. The office focuses on the marketing and selling of consumer products in the Benelux area, and not on the development and production of goods.

Location decision and motivation

Being originally located in Delft, Samsung decided to move the sales and marketing part of the company to Schiphol in 2016, while the logistics part of the company stayed behind. There were a number of evident problems in Delft, especially with the public transport not up to the mark for the accessibility requirements of the company. During the relocation process, Schiphol was chosen as the most preferred option over other alternatives such as Amsterdam and Zuidas because of the following reasons. Firstly, about 55% of the employees live closer to Amsterdam and for the remaining 45%, Schiphol as a location is easily accessible, especially compared to the office in Delft.

Secondly, all of Samsung's offices are based at strategic locations, and Schiphol serves as one of them. With Samsung being a multinational company, it has a large number of international travellers, especially from South Korea and London and this office location provides a direct connectivity to the terminal.

Thirdly, Schiphol also offers a large number of shared services, such as the library, restaurants, bars and other additional facilities, this helps in catering to the new work-life balance that a number of employees now demand. At the same time, Schiphol has an international vibe to it, that supplements talent attraction and also played a major role in the decision to locate here. This is illustrated by the interviewee as:

"Like the new generations they want to work and have a private life. It's linked to each other and so work balance, and people not only want to work but also want to have fun. And so we could manage that in this building. So as example we also have a gym here, where a lot of people are using it us for kickboxing lessons, gym and yoga. And so we can offer a range of possibilities. That's why we're here. Also, there's a certain vibe here, it really attracts talents. It's difficult to get people in, also students. So we work a lot together with the Erasmus University in Rotterdam and UvA here in Amsterdam. Schiphol is an attractive place to work somewhere, somehow. It has a certain vibe which people like, so a lot of reasons to move here."
(Interviewee B, personal communication, March 10, 2020)

Advantages

With the ease of access to the terminal and the number of international destinations that Schiphol offers connections to, this office is considered to have one of the best locations among the European subsidiaries of Samsung. After relocating here, there has been an increase in the number of European trainings and meetings taking place in this office, instead of the London head office. In that sense, there has been a change in function for the office at Schiphol, which now acts as a head office in certain aspects, with the number of hotels and restaurants in the surrounding also contributing to this factor. Along these lines, the interviewee states that:

"We saw some other advantages. In general, I think we have the best location in Europe of the Samsung subsidiaries. So what we see now by locating here we have a lot of travellers, in general a lot of European trainings they want to have it here. Not in London, but here, because as you can see it's like 10 minutes' walk to the plaza. Like in London, that's our head office, but when you land in Heathrow you still have to take a taxi for like one hour. And then you are at the office and here it's a 10 minutes' walk. So it's quite central. There are a lot of facilities."

Also hotels, restaurants. And the side effect is that we have a lot of questions and a lot of meetings arranged here for Samsung in Europe. So we're acting little bit like a head office, somewhere somehow. It's a side effect, we didn't know.

(Interviewee B, personal communication, March 10, 2020)

The brand value of Schiphol as a business location also played an important part in the decision making process as it attracts a number of other European headquarters and important branch offices.

Real Estate demands

When relocating to Schiphol, Samsung had the freedom to design and develop their own office space and were able to incorporate a number of their own facilities such as a gym and restaurant. As mentioned before, with the increasing number of requests for European meetings and trainings, there was an evident need for spaces to cater to these demands. Also, a number of smart building measures have also been deployed in the office, which also help in the optimization of the available office space.

Portfolio structure

This office is categorised as a core building for Samsung, in that it has been acquired on a long term lease contract, and acts as important global office, with about 300-400 employees working here. The office serves as the Sales and Marketing function for the Benelux area, and as a strategic location for the company.

Flexibility

In general, the company culture at Samsung currently does not incorporate flexible accommodation strategies, but while relocating at this office, Samsung was able to implement a more flexible workplace concept. In doing so, the current office has become a benchmark for other Samsung subsidiaries across Europe and is widely appreciated by its partners and customer for its accommodation strategies. The participant states that:

"That is important, because Samsung is a Korean company. It's a completely different culture from our culture here in the Netherlands or Belgian culture. Koreans are more about visibility. It's important that you're here. They want to control. It's more like OK when you work here, we have to see each other inside and discuss. Maybe that's a little bit old fashioned, I think. And we are changing that. Also when we moved here we started working from home. I saw flexibility improved. It's still sometimes difficult for the Korean culture. And so flexibility is difficult for them to understand."

(Interviewee B, personal communication, March 10, 2020)

At this office, Samsung is currently located with two other tenants, Samsung Air Conditioning and DS Smith on the upper floors. With both the Samsung subsidiaries possibly expanding in the coming years, the current office space might not be enough to accommodate the spatial needs, this shows a need for flexibility in terms of the space to accommodate the growing demand of the future.

Spatial Proximity to other companies

Currently, there are certain initiatives to increase the interaction and work together with companies located close by, such as Microsoft, Cargill, Schiphol, Heineken and KLM, these include working on a mobility initiative wherein employees can have shared car rides with employees from other companies travelling to Schiphol from other parts of the Netherlands. Being located in close spatial proximity and working together with other companies promotes a sense of a community within corporations and enhances interaction among them. Along these lines the interviewee states that:

"[...]But it should improve. But I'm really in favour to have more contact. And so last year we increased contact so with Microsoft, Schiphol Group, Cargill, Heineken and KLM. So we are working on all kinds of mobility issues for the airport to make it more approachable. So we work together on all kinds of mobility solutions.

So we're going to work with electrical cars, pool cars, bicycles and we are starting this year. So we have a lot of initiatives and we're also working together on an app, it's already there. You can drive together with each other in cars with people from Cargill, Microsoft, if they live in Rotterdam they can check, who is going. It feels like a Tinder but then for mobility so you can swipe and then oh yeah. It's a little bit of a coincidence that we're next to each other, but I would really like to increase the contact and I'm doing this really also. You can learn from each other also."

(Interviewee B, personal communication, March 10, 2020)

Challenges

Although the company does not face any major challenges with the office space, there are certain general issues such as the parking, the elevator and a lack of traffic lights for pedestrian movements in the Schiphol CBD area, which can be worked on through a simple and continuous feedback process.

Another challenge that the company might face in the coming few years is whether the building is big enough to cater to the growing demand for the future. With the total square meter occupied by the company being fixed, and with two other tenants in the same building, the accommodation strategy might need to be updated depending on the future. This is highlighted by the participant as:

"As an example, we also have Samsung Air Conditioning, it's a separate company also from Samsung, and they are really growing, so it's getting too small. So we have Samsung sales and marketing here. The sixth and seventh floor are DS Smith, that's a different company. So they are separate from us. Then we have the fifth floor which is Samsung air conditioning, and we have ground floor, first, second, third and fourth.

We hope that DS Smith will somewhere somehow leave the building. And then we can rent the floors for the coming years. Especially, also the Samsung air conditioning company at the fifth floor, are really growing fast. They are asking me also like. But the sales and marketing organization is also quite full, we need all the space. We can't just say to air conditioning that you will get a floor here. But then again flexibility also plays some kind of a role there, so that's what we're working on."

(Interviewee B, personal communication, March 10, 2020)

Opportunities

During the interview, certain points of opportunity became clear and could be used by Schiphol Real Estate for the future. First, offering different flexibility options, financially and spatially, in multi-tenant buildings, with unclear spatial demands for the future could be the way forward.

With Samsung promoting new workplace concepts at this new location, there is an opportunity for Schiphol to offer new workplace models to other new companies, wherein their office at Schiphol acts as a new testing ground for the corporation when trying to incorporate a new workplace strategy or set benchmarks.

Conclusions

The findings from this case study show that relocating Samsung’s sales and marketing office was a strategic decision to improve its accessibility requirements compared to its previous location in Delft. Moving to this location increased the relational proximity with other European subsidiaries, while having more trainings and meetings here and moving towards a more collaborative style of working. Using the number of shared facilities provided by Schiphol and the use of smart building tools also influenced this decision, and helped the company move towards a more flexible workplace concept. Lastly, this office belongs to the core part for the company’s portfolio, in that it has been acquired on a long term lease contract and houses core functions that serve the Benelux area. These mentioned aspects have been illustrated in figure 28, under the theme of ‘Airport Office location’, as they work within the theoretical framework previously developed.

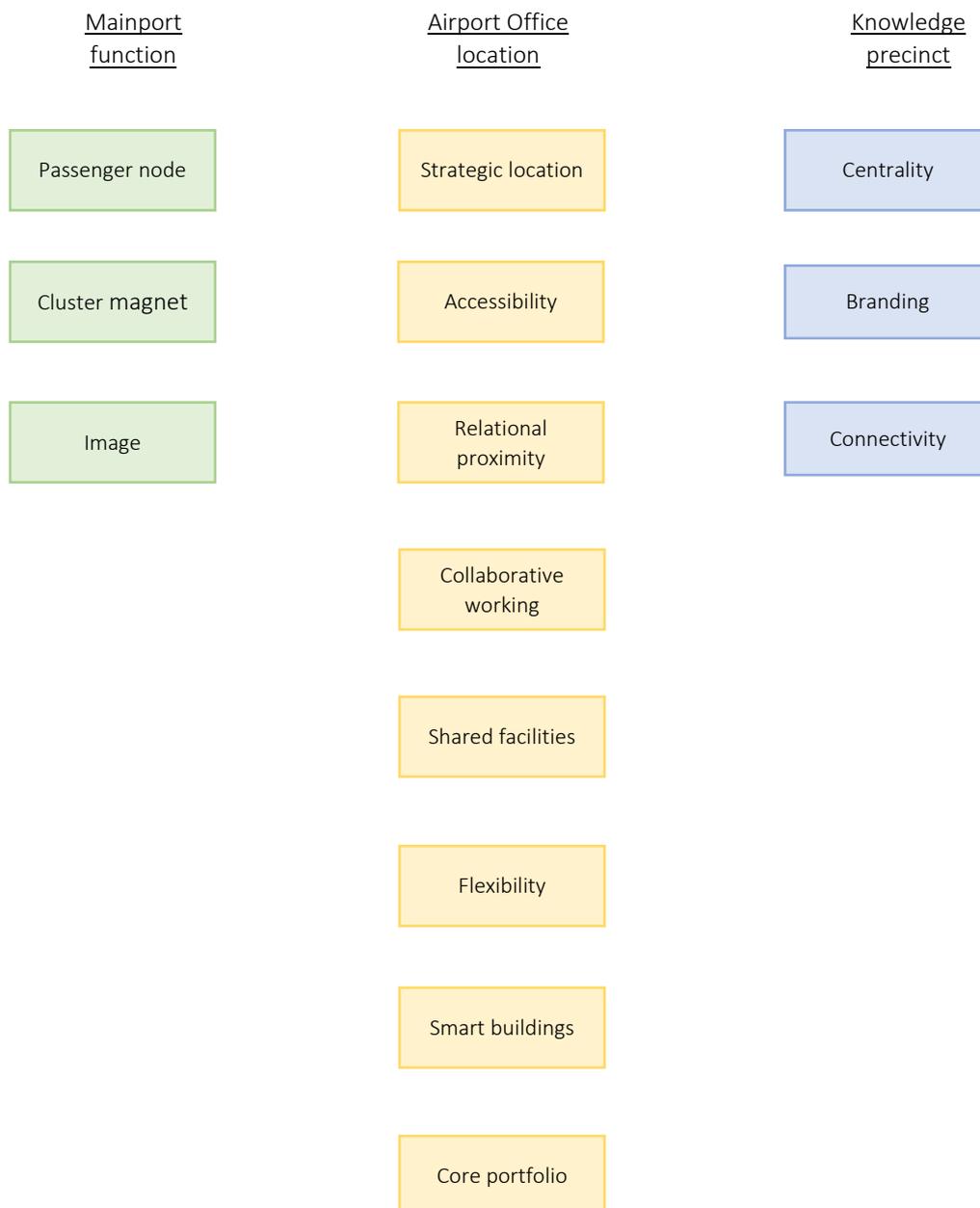


Figure 28. Findings from case B (centre column) in the theoretical framework (own illustration)

Case C. John Laing Group, WTC, Schiphol CBD

Nature of work at the company

John Laing Group is an investor in infrastructure and renewable energy projects, and deliver specific assets such as roads, bridges, hospitals, wind farms and solar farms. They also arrange the financing for these projects, and thus the nature of the work at the company can be categorised in the Advanced Producer Services (APS) part of the knowledge economy. With a number of offices globally, in Europe, North America, Latin America and Asia Pacific, John Laing have their headquarters in London, where most of the senior management and staff are located.

Location decision and motivation

Initially John Laing Group had moved to the Netherlands to work on a pipeline of PPP projects, and they had a set of certain basic requirements such as car parking facilities, close proximity to the airport so that the employees could fly out and come back to office and to be at a business centre. Firstly, the accessibility that Schiphol as a location provided, as compared to some other alternatives such as the Zuidas, to other parts of the country was a major reason for this decision.

Secondly, one of the most important factors was the availability of serviced office space, in that sense, it was the concept of the World Trade Centre that highly appealed to the company, wherein the WTC offered the servicing and management of the office space. Being a company with close to 15 employees working in the office at Schiphol, having an office space with shared facilities such as a reception, lobby area, restaurant and printing facilities had a bigger impact on the business, rather than just the location of the company.

Thirdly, an important factor was the lease contracts offered at Schiphol, as having located at the Zuidas would have increased the rent levels by two or three times, projecting a wrong impression to the clients. This is illustrated by the interviewee by mentioning:

"[...]So I think it's the best transport hub that the Netherlands has for passengers, for good maybe it is the Port of Rotterdam. But for our purpose it meets all criteria, you can drive, you can go by train, you can go by public transport, you can take a plane. You can park right below, we have parking facilities which is also pretty convenient and it has everything in terms of office requirements right. So we're not a big company we only have 10 people here and you just need to have a lot of facilities around to make it easy so it wouldn't work for us to be in the middle of nowhere right. And here you have everything. In terms that you can have lunch, you can have printing facilities, you can you also have sporting facilities. I mean again you can go to Plaza to Schiphol a lot of shops and retail etc."

(Interviewee C, personal communication, March 5, 2020)

Advantages

Along with being described by the interviewee as the best transport hub in the Netherlands for passengers, the additional facilities and services such as bars, restaurants, printing facilities etc., that help in the smooth functioning of the office. At the same time, even though the office was established to serve mainly the Dutch market, being located at the airport has helped them to be a part of a European team, and thus with the convenience of the international travel, increased the relational proximity with other branches of the company. Although the brand value of Schiphol also helps in attracting some of the customers and also for the company, that was not the main reason that influenced the location decision for the John Laing Group. Along these lines the interviewee states that:

“Well, I mean so the Dutch office has been specifically established to work on the Netherlands. So I think it was an additional convenience to be located at the airport. And we have seen the benefit of it because now we are kind of mixed as one European team. You have offices now also in Tel Aviv. We also are planning to open offices in Poland. London obviously is the headquarters. We have offices in Madrid. So being located at the airport makes it very convenient to also connect with colleagues in all of these other offices. So, in the end, it's enabled us to really be part of a European team more so than just being a Dutch team.”
(Interviewee C, personal communication, March 5, 2020)

Real Estate demands

As mentioned before, the additional services and facilities such as the reception, coffee bar, restaurant, cleaning and maintenance, which are given by the office provider, in this case the World Trade Centre, are significantly important for the smooth functioning of the office. Being a small office space, the interviewee has laid special emphasis on these facilities and amenities, rather than an accommodation strategy implemented, as seen in the previous interviews.

Portfolio structure

This office is categorised as a peripheral office for the John Laing Group, in that it has been acquired on a five year lease contract and houses the satellite functions for the main head office in London, which houses the senior staff and management of the company.

Although this office acts as part of the peripheral portfolio, due to its locational advantages, it has a different functional use for different employees. On the one hand, the employees in this office who serve the Dutch market use the space on a permanent basis, and on the other hand, they have a number of international travelling employees who use this office space for short periods of time while travelling from one destination to the other. This is illustrated by the participant as

“I think something in between. Yeah well we do not own offices so I think all of our offices are rentals or leases. I think the head office has a very long lease indeed, in London. This one also has a pretty long lease. I think it's like five years or so it's not a very short term lease”

“I think we get a lot of praise because people find it very convenient right. Especially when they fly in, fly out, to the Netherlands they hop by our office many times. So we have international relationships who find it very easy to just stop by because it is on their way in or out of the country, which is very interesting.”
(Interviewee C, personal communication, March 5, 2020)

Flexibility

Although flexibility is not the main intention or ambition of the company, to have more flexible options in terms of space and financials might be an appealing option. An interesting approach taken by the company is that while trying to enter a new market or a new region, renting a space with a co-working space provider is a viable option, because this provides the flexibility to use the space for a shorter time period, without having a high lease obligations.

“But what we do tend to try and do is when we go to a new region, for example we're talking now about Poland or Tel Aviv is a good example that's open last year. But what we did is we rent the space like WeWork just because of the flexibility and easy to access and the flexibility to move out as well indeed. So that's what we also did in Bogota, I believe also where we have opened a new office. So I think that trend is now we want to be at more places but to not want to have a very high lease obligation, to remain flexible to be able to move out as well if things don't work out.”
(Interviewee C, personal communication, March 5, 2020)

Spatial proximity to other companies

The employees at John Laing Group do not necessarily benefit from being located in close proximity to other companies, as there is no significant interaction outside the company. This finding is in contrast with the literature review, in which the spatial proximity and interaction with other corporations is defined as one of the core concepts in a knowledge precinct.

On the other hand, due to the location of their office at an important transport hub, spatial proximity rather corresponds to the ease of access, nationally and internationally, with a number of their partners and customers. This aspect was mentioned previously in any of the literature findings, and adds to the existing line of literature for the knowledge clusters at transport hubs. Along these lines, the participant states that:

“So we have international relationships who find it very easy to just stop by because it is on their way in or out of the country, which is very interesting. But also for local contacts I mean it's practically Amsterdam, but we also have a lot of partners here in Hoofddorp, which is on the other end of the highway, which makes it also very convenient. It's just a five-minute drive.”

(Interviewee C, personal communication, March 5, 2020)

Challenges

The interviewee did not mention any significant challenges as a result of their location or the real estate provided at the Schiphol airport.

Opportunities

The interview presented certain opportunities that could be used by Schiphol Real Estate to cater to the future demands of the corporations. There is an extremely high demand for serviced offices, which satisfies the main needs for corporations occupying a smaller office space.

Also, for new companies trying to enter the Dutch market, Schiphol can serve as the go-to location by catering especially to their demand by providing financially flexible options, and further partnering up with other co-working providers. This way, the new companies have an opportunity to set up their office at a location that provided efficient transport throughout the country and has the suitable real estate setting for them.

Conclusions

The findings from this interview show that along with the accessibility provided at Schiphol, one of the main reasons for the company to locate here was the availability of serviced office spaces. Being a small office, the shared facilities and services offered by the office provider contribute significantly towards the smooth functioning of the company. Also, the ease of access at the airport has helped to increase and maintain the relational proximity with their clients and customers. Although this office forms a part of the peripheral portfolio, it serves a different function for different employees. These aspects have been illustrated in figure 29, under the theme of 'Airport Office location', as they work with the theoretical framework previously developed.



Figure 29. Findings from case C (centre column) in the theoretical framework (own illustration)

Case D. KLM Digital Studio, Tristar 3, Schiphol East

Nature of work at the company

KLM Digital Studio is part of the KLM Royal Dutch Airlines Group, in which they digitize for the parent company and develop digital products such as iPad apps for the cabin crew, pilots and the ground staff at the Schiphol airport. Working as a digital transformation team that explores new technologies such as augmented reality, virtual reality, automation and artificial intelligence, the company is categorised as a High tech Industry in the knowledge economy, mainly focused on research and development work.

Location decision and motivation

KLM Digital Studio started out as a small unit in 2015 in one of the KLM buildings at the airport, and by 2016 as the department was growing, they needed more space as a unit. KLM Real Estate found the current office location at Tristar 3 in Schiphol East, for the department to move in, and this decision was based on two reasons primarily. Firstly, locating at the airport was a logical step as the department is a part of an airline company and they work for KLM employees, and no other external customers. So proximity to other KLM departments was more important than the connectivity and accessibility offered by Schiphol.

Secondly, the current office location was chosen due to fewer options available at the Schiphol CBD and at the KLM headquarters. There was also a significant difference in the rent levels between East and the CBD, wherein the rent levels at the CBD were considerably higher. So, at the end, the connections provided by public transport and the accessibility by car travel is an added advantage for the company, but was not the main motivation for the office location. Along these lines, the participant states that:

“Why here? As a practical reason. Because here we are the closest, so we work for our employees as I said. Pilots- they are at home or they are flying or they are in a hotel somewhere abroad. Cabin crew is the same, at home, flying or abroad. To say that you want to be located near them is a bit difficult, but this is the easiest and the most convenient for everybody. We also work with people at the airport.”

“But if you would rent this office at the airport, so the first question is would there be space available, is a question mark. But secondly, the prices for rent at the Schiphol Center are much higher, you pay like 600 euro per square meter. And here I think it's about 140-150 euros. A huge difference. Yes of course at the airport and all the shops etc., that's the most expensive space. So that's why we are here. And why are we not at KLM head office, for example, at the head office we don't have 3000 square meters available. But, we also don't want to be at the head office climate and head office environment. We want to be in an operational environment for all of these. This place is the closest that we can get at a reasonable price to all our employees.”
(Interviewee D, personal communication, February 20, 2020)

Advantages

As described by the interviewee, the additional services and facilities, such as supermarkets and restaurants play an important role to make the workplace more attractive and help in the smooth functioning of the office.

Real Estate demands

One of the key real estate aspects mentioned during the interview was that the department had the freedom to design their own office space, and were able to create a more creative work environment, which was different from a traditional office design. This included using specific kind of furniture for example, which made the office space more vibrant and representative of the work done by the department. As stated by the interviewee,

*"You know the second-hand stuff, this comes from engineering maintenance. This is what people like. You see the lockers, a designer made them fancier. That's what people like. So it looks like KLM, you do see sometimes KLM elements. Yeah but it's also different. It's not the traditional classic KLM office environment, it's more creative."
(Interviewee D, personal communication, February 20, 2020)*

Portfolio structure

Although this office started as a peripheral office space for KLM, over the years, with the expansion of the department, it looks to be part of the core portfolio.

*"[...], we started as peripheral, but now we are here already. So since November 2016. So it is more than three years now. So it looks more and more like core. And to be honest I think we will remain here for a while. Still a few years. I think it's core."
(Interviewee D, personal communication, February 20, 2020)*

Flexibility

Although flexibility demands were not the core ambition of the company, but because they work with other personnel at the airport, the employees at KLM Digital Studio have the freedom to organize their meetings at their current office in Schiphol East or use other KLM facilities near the Schiphol CBD. This gives them a form of flexibility to have different options to work from and being location-independent within the airport vicinity.

Spatial proximity to other companies

As mentioned before, the employees of this office work with the other departments of KLM, thus about 90-95% of their interaction outside the office takes place with personnel from other KLM departments. In that sense, it is convenient that the other departments are located in close spatial proximity. Other than this, there is no significant interaction with other corporations located close by.

"So I think 80-90 percent of our interactions, 95% is with KLM departments. And to our ground services is at the airport. They take the bus or come here we go to that building. Then there is KLM in-flight services- cabin crew building. But these are mainly office people."

*"So we are pretty much already clustered with all KLM divisions/ departments on this place. So yeah we are pretty central. And then other companies along with Perfetti, we share the building but we don't work with them right now."
(Interviewee D, personal communication, February 20, 2020)*

Challenges

Although there are no challenges mentioned by the interviewee with respect to the real estate provided and the location of the office, there are certain soft factors as mentioned by the participant that could be looked upon. There is a lack of interaction from the side of the landlord to check on how the building functions. The interviewee described it as 'lacking a sense of ownership' from the side of the landlord, once the space has been rented out.

Another challenge mentioned was the lack of sufficient charging point for the electric cars and bikes, and certain minor criticism with the sophistication of the parking systems.

*"The point was I was thinking before was that the ownership thing, well I already mentioned that. So if you have a problem in-house like the fridge is broken or the sink is broken or whatever, and so you call and you want to get it fixed, because you don't want to spend the whole weekend without a working fridge or that your freezer is warming up etc. So that's the same here. So when you have a problem needed to be fixed, you want the landlord to take up responsibility and take ownership and solve things. To be a bit proactive and take an active role in getting and keeping this place safe and attractive environments to work."
(Interviewee D, personal communication, February 20, 2020)*

Opportunities

During the interview, there were certain opportunities mentioned that could contribute towards developing the strategic recommendations for Schiphol Real Estate. One of the factors with respect to this is increasing the interaction and improving the relations between the landlord and the tenants, in that it could be achieved through continuous feedback techniques such as frequent occupancy evaluations, monthly meetings, etc.

Another point mentioned during the interview was as Schiphol cannot compete with Amsterdam centre in terms of the quality of its location, it needs to maintain and focus on its own unique selling points to attract and maintain its tenants.

Conclusions

The findings from the interview show that the main driving factor for the location of this office was the proximity to its customers, the people who work for an airlines and at the airport, the ease of access provided by Schiphol as a transport hub can be seen as an added advantage to its location. Another important factor that influenced this was the availability of office space and the lease prices offered at this location. The shared facilities provided by Schiphol in the area also help in the smooth functioning of the company. Finally this office forms part of the core portfolio for the company and is to stay there on a long term basis. These aspects can be seen in figure 30, under the theme of 'Airport Office location', and how they work within the theoretical framework developed previously.

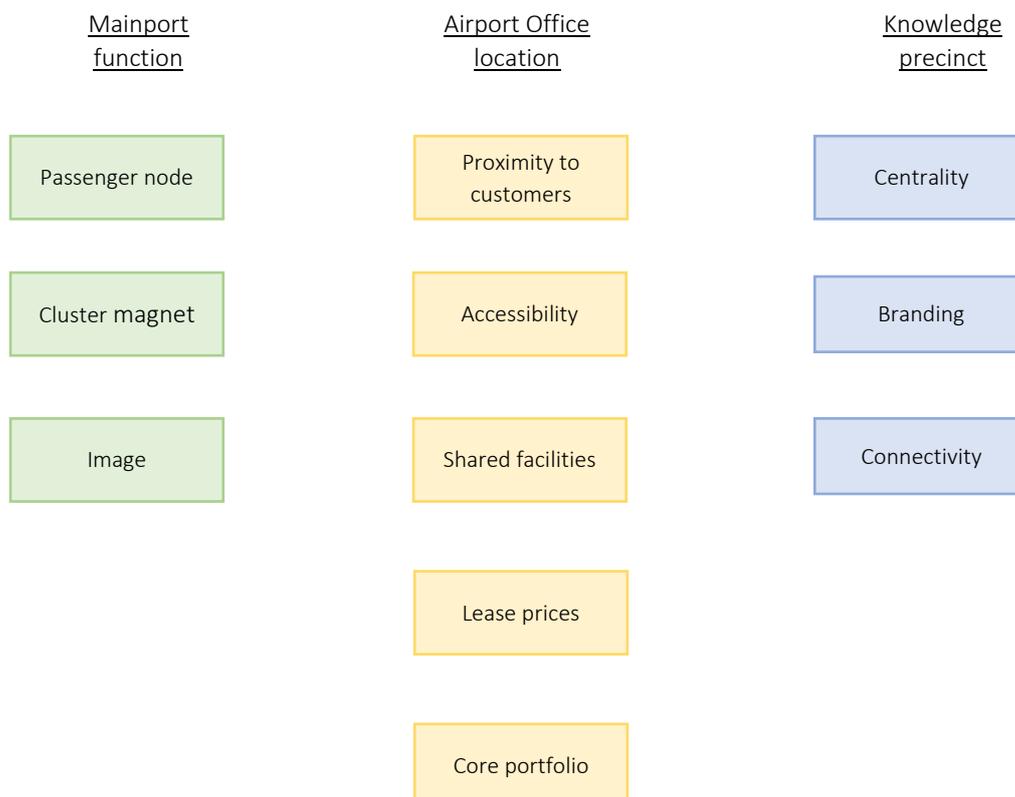


Figure 30. Findings from case D (centre column) in the theoretical framework (own illustration)

02 Cross-case Analysis

Based on the analysis of the four case studies, a cross-case analysis is presented wherein the findings from the cases are compared to assess the similarities and differences of the demand side. The codes and sub-codes from ATLAS.ti, as shown in figure 19, which were present or not present during the case studies, and those deemed important by the interviewees have been highlighted below in table 6 for each of the cases. These findings are based on the main themes of the empirical research, namely, location decision and motivation, advantages, real estate demands, portfolio structure, flexibility, spatial proximity and the challenges. A cumulative analysis of these themes has been presented below, after table 6.

Themes	Case studies			
	A	B	C	D
Location decision, motivation				
Strategic location				
• Accessibility to clients				
• Employee accessibility				
• Workplace transform				
WTC concept				
Relations with landlord				
• Lease prices				
Advantages				
Collaborative working				
Relational proximity				
International vibe				
• Additional facilities				
Talent attraction				
Schiphol brand value				
Real Estate Demands				
• Shared services				
Right-sizing office space				
• Meeting, training areas				
• Design own office space				
Smart applications				
Portfolio structure				
• Core portfolio				
Peripheral portfolio				
• Varying functional use				
Flexibility				
• Demand				
Workplace culture				
Spatial proximity				
Interaction				
Community vibe				
Challenges				
Adding smart applications				
Hotel costs				
Uncertainty with future				
Landlord interaction				
General issues				

Legend

	Present
	Not present

- Most repeating themes across the case studies

Legend

	Present
	Not present

- Most repeating themes across the case studies

Table 6. Matrix showing the cross-case analysis, based on the main themes

Location decision and motivation

- Location as a strategic decision

Based in the size of the companies, the airport location can be seen as a strategic decision that contributes to the overall business of the corporations, as seen for cases A and B, these offices are the Sales and Marketing offices, and have continuous interactions with their clients and partners, both locally and internationally.

Whereas, as seen in case C, the location decision does not affect the business significantly, it is an added advantage. Instead the concept of the serviced office space is more important, wherein the management and the servicing of the office space is provided by the office provider, such as the World Trade Centre. Similarly, for the case D, locating close to the parent company was the driving factor for selecting the location.

- Accessibility provided is the key factor

As seen in all the case studies, accessibility provided at the airport is considered one of the key factors of the corporations to locate there. With its multi-modal forms of transportation, Schiphol acts as one of the best passenger hubs around the world, in that, on one hand, the inland accessibility to different parts of the country is important for the companies and the employees who focus on the local Dutch market, while on the other hand, the connectivity to the airport terminal and the frequency of flights from Schiphol is crucial for companies that have a large number of employees who travel internationally. This provides flexibility to meet their clients and partners with a variety of modes of transport available and to reschedule business appointments more conveniently. At the same time, Schiphol is easily accessible from all parts of the country, which enables the corporations located there to draw from a wide pool of potential employees, rather than being restricted due to their office location.

- Push factors from other locations

As seen in the case studies, the Schiphol location was selected after weighing it with other alternatives in the surroundings. There were certain push factors, such as the limited space and the extremely high lease prices in Amsterdam, the high lease prices and the quality of transport facilities at Zuidas and certain connectivity issues and a lack of an urban vibe at Hoofddorp.

- Pull factors

For some of the larger companies, such as for case A, the relationship with the landlord also plays an important role, in that the company and the landlord benefit from it, and, the tenant acts as an anchor tenant, which helps in attracting other companies. Also, the freedom to innovate and design the workplace themselves, according to the culture and the working style of the company is a significant pull factor, as seen in cases A, B and D.

Advantages

Along with the location convenience, there are certain advantages that Schiphol as a business location offers, which also help in the smooth functioning of the office. Firstly, the parking facilities and a number of other amenities such as restaurants and cafes offered at Schiphol are important for the companies, as seen across all the cases.

Secondly, with a large number of international partners and clients and accordingly having an office at the airport, makes the companies a part of a bigger team and the office works as a European hub, thus increasing relational proximity within the company, especially as seen in cases B and C. There has also been a shift in the way of working, from individual productivity to team collaboration with partners and customers, especially for the larger companies (cases A and B), a large number of European trainings and meetings take place at the Schiphol office.

And finally, even though the brand value of the Schiphol airport was not a factor that primarily influenced the decision of the companies to locate here, it acts as an added soft advantage for them.

Real Estate demands

Based on the case studies, the real estate demands of the knowledge corporations are classified mainly based on the size of the company at Schiphol. Although there are other factors such as the company culture and the environment that also affect these demands, the primary differentiation can be made as per the size of the office that the company has occupied at the airport.

- For smaller companies

As seen in Case C, these companies usually have a set of basic requirements, such as additional services and facilities such as a reception, coffee bar, restaurant, printing facilities, cleaning and maintenance services, outside their leased office space. These additional services being provided by the office supplier are significant and play an important part in supporting the business of these offices.

- For larger companies

These companies that usually occupy a much larger office space and serve a number of employees, focus on a more collaborative style of working with their customers and partners, and thus need more space for such activities as seen in cases A and B. Their accommodation strategy is also based on an increasing trend towards digital transformation, and thus a need for smart buildings, which helps in the optimisation of space. As seen in case A, partnering up with a co-working space provider, proved to be an efficient strategy, which led to an optimal usage of the office space by reducing the footprint, and using the common facilities provided by Schiphol in the Airport City.

Another factor that affects the real estate demands of the corporations is the location of the office. For a company located in the Schiphol East, such as for case D, having an option to occupy meeting spaces for shorter periods of time, and which are closer to the terminal can be advantageous.

Core and Peripheral portfolio

As seen through the empirical research, there is an even mix of core and peripheral portfolio buildings for the companies at the airport. An interesting finding was that although the offices might be classified as core or peripheral, but because of their locational advantages, they serve different functions for different employees, as seen in cases A, B and C. These offices serve the purpose of a permanent workplace for the employees that serve the local Dutch market, and at the same time, act as a satellite office for a number of their international partners, who travel frequently for business.

Flexibility

Flexibility was one of the key topics, that was mentioned by a number of the interviewees, and has a different level of importance for different corporations, based on their individual needs and demands. The flexibility aspect can be divided into two main sub-topics which are highly dependent on each other, namely, financial flexibility and spatial flexibility.

- Financial flexibility

Financial flexibility was not necessarily a part of the accommodation strategy for the smaller companies, for them the concept of the serviced office spaces was more appealing. On the other hand, for the larger corporations, having financially flexible options, in terms of the exit strategies and the lease contracts can play an important role in their accommodation strategies.

- Spatial flexibility

Financial flexibility is complemented by spatial proximity, in terms of the amount of space occupied by the corporations. Corporations in multi-tenant buildings and single tenant buildings might benefit from this aspect, in that, for the multi-tenant buildings, in case a number of companies want to expand and occupy more space where other companies are already located, spatial flexibility can play an important role. On the other hand, for single tenant buildings, spatial flexibility might be a challenge as expansion would create a need for more footprint that might not be available in the same location, and shrinkage can help in sharing the space with another tenant within the same building.

Spatial proximity

In contrast to theory, the empirical research shows that there is no significant sharing of knowledge between different corporations, and they do not necessarily identify the added benefits in locating close to other companies. But, some corporations identify a sense of belonging to a community while locating with other companies, which helps them take shared initiatives and work together with others, thus creating an opportunity for the sharing of knowledge, as seen in case B.

An interesting finding shows that for transport hubs, such as the Schiphol Airport, corporations do not consider spatial proximity as being physically located next to each other. Due to the strong travel connections and the multi-modal forms of transport available, spatial proximity is rather characterised by the ease of movement to different business locations, which actually helps in the sharing of knowledge and creating a strong business network for them.

Challenges

Although the corporations did not consider any significant challenges at Schiphol, there are certain underlying themes which were highlighted in the interviews. Landlord interaction- a more active involvement from the side of the landlord, through a continuous feedback process, such as regular Post-Occupancy evaluations or monthly meetings can be seen as a way to interact more with the tenants.

In some cases, such as multi-tenant buildings, uncertainty in the future needs of the company might lead to expansion or shrinkage of the footprint of the office and thus shows the need for flexibility.

Opportunities

Through the cross-case analysis, there are certain areas which present opportunities for Schiphol Real Estate to focus on, especially with a significant importance towards flexibility. There is an opportunity for Schiphol to provide certain financially flexible options to first-time movers to Schiphol by partnering up with other co-working office space providers or exploring such options in-house. In this way, Schiphol becomes a go-to option for new companies trying to enter the Dutch market, and makes it a convenient place for them to start. A different approach for Schiphol CBD and Schiphol East can also be focused on, by providing different types of lease contracts and exit strategies based on the location, and thus creating unique selling points for both the areas.

For the smaller corporations, there is a high demand for the serviced office spaces, and at the same time, offering shared services outside the leased office space is attractive for all types of corporations.

And finally, another important area of focus is the digital transformation of buildings, through smart building tools which helps in the optimisation of the available space and supports Schiphol's ambition to become a Smart Airport City.

03 Combined findings: Supply side

After understanding the point of view of the demand side through the case studies, three more interviews were conducted to complement this from the supply side. This included two interviews with Schiphol Real Estate, the primary office developer at the airport, and Provider E, that works as a co-working office supplier in the area. These interviews were also based on the similar themes identified for the case studies, with certain alterations made addressing the supply side, and their combined findings are presented below.

Knowledge economy

Schiphol Real Estate works as a facilitator to the national Mainport strategy, following its pace and providing office spaces for the corporations. One of the most important aspects of the Mainport strategy is the number of international destinations that Schiphol offers, making it an important business location, in that the strength of the Mainport strategy influences the attractiveness of Schiphol as a business location for corporations.

"[...] I think the reason that Schiphol is an important business location for innovative companies has everything to do with our main strategy. And I think for us, the most important factor in the Mainport strategy is what we call, let's say in our key performance indicators is the number of destinations. I don't know the current figures exactly, but I think there is 260 intercontinental destinations from Schiphol to the world. And that's what makes us an interesting location. So I think that everything that we do to increase the strength of the Mainport, increases the attractiveness of Schiphol as a business location for innovative and international companies."
(Interviewee G, personal communication, April 23, 2020).

Until now, Schiphol Real Estate focused not only on the knowledge intensive corporations, but also on companies from other sectors such as food and production, the main focus being on companies that work internationally, and not on the sector of the economy they belong to.

But in the coming years, Schiphol plans to deploy a number of initiatives to attract more knowledge corporations, and make them a target group. On these lines, one of the initiatives is the partnership between Microsoft and Spaces in the Outlook building in the Schiphol CBD, with the aim of making the office an innovation hub, and attracting knowledge intensive companies.

"[...] I think for us they are a very interesting target group because very often these are also innovative companies that act cross-border, so international. So for us, these are typically companies who would like to locate in our area. And we have a number of initiatives where we actively try to seek the innovative companies in the knowledge economy. And one obviously is the cooperation we have with Microsoft. One of the things they really want to accomplish is that their current office acts as sort of a hub that is attractive to innovative companies, through which they strengthen their own networks. So on request of Microsoft, we came up with the Spaces, shared office space in the same building, which obviously has as the potential or at least which has the idea to strengthen the location for companies in the knowledge sector. So that's something we're doing at Schiphol centre."
(Interviewee G, personal communication, April 23, 2020).

Location decision and motivation

Schiphol works as a hub or knowledge precinct, just as Amsterdam and Utrecht, where a large number of corporations prefer to locate, because of the external economies of agglomeration and the global networks functions, which is an important factor that influences an office provider in the area. The findings from the interviews also align with the previously developed literature review, in which the Schiphol displays the three main functions of a knowledge precinct, namely, centrality, connectivity and the branding, which is the main motivation for companies to locate there. An additional aspect mentioned was that Schiphol provides an added advantage for the war on talent, which also attracts a number of companies.

“Well we look at a user perspective and most of our users had to travel. And when you travel you look at the hubs where you meet and work easily together and Schiphol, just the train station is a hub where a lot of people come together and you need to be at the right hubs as an office provider. And for us just Utrecht, just as Amsterdam, Schiphol airport is one of the main absolutely top hubs.”
(Interviewee E, personal communication, February 28, 2020).

Business model

Schiphol Real Estate follows a traditional type of business model, in which the assets can be divided into two parts, the land and the buildings. The land is leased out to companies who set up their offices on a long term basis, such as the KLM Maintenance buildings in Schiphol East, and similarly, for the building portfolio, wherein the corporations occupy the offices with a fixed rent and on long term lease contracts, about 10 years. With the high demand of office spaces due to the attractiveness of the area, following this traditional business model proves to be highly beneficial for Schiphol.

The real estate is occupied by both, aviation and non-aviation related companies, with the distribution at a 60-40 ratio respectively, with the Dutch government, Microsoft, Samsung, Cargill and Wereldhave being few of the major non-aviation tenants. With an even mix between the aeronautical and non-aeronautical companies, Schiphol Real Estate is able to distribute the risk evenly, and aims towards increasing the proportion of non-aviation related tenants, and thus promote the knowledge economy to develop further at the airport.

“I think the largest part of our business model is very traditional real estate. So what we have is we have land, we have buildings. So a part of the land we lease out to companies who use it, for example, to put their own buildings so that the best example is the big maintenance buildings that KLM has in Schiphol East. Our business model is very simple. We get a fixed amount of rent for the land every year, regardless of what happens on it. So that's one part. And a large part of our building portfolios, the same. I think most of our business is as a fixed rent with long term rental agreements. So we receive the rents for tenants of the building, regardless of whether the building is full or empty, it's really fixed.

[...] So most of our business is very traditional. I think the reason we can still do that is that there is some kind of inherent attractiveness of the area. So companies are going to come to Schiphol, whether we are flexible or not.”
(Interviewee F, personal communication, March 24, 2020).

Real Estate

Schiphol Real Estate works as an investor-developer, that rents out bare office spaces, consisting of just the floor and walls, wherein the tenants have the freedom to design and orient the space in a manner that suits the working culture of the company. At the same time, they recognise that there is a demand for both, serviced and self-managed office spaces, and aim to cater to both the demands. With an increasing demand for serviced office spaces, Schiphol has added one serviced building in Schiphol East and two in the CBD, in the recent years. These buildings house a variety of tenants, the larger tenants usually demanding long-term lease contracts and the smaller ones opting for short-term contracts.

“But obviously the world is changing. So what we are trying to do now is to get an increasing part of our portfolio, to make our business model more flexible. Which is the reason that we cooperate with Regus, and Spaces and Nest and all of these other flexible office providers to make sure that our area is not only attractive for companies that can have fixed rental contracts for say 10 years, but also for companies that want to come to Schiphol because they have certain project or a certain business to do for a shorter period of time or with more uncertainty for which they need more flexibility. But, the largest part of our business model is still very traditional, long term real estate.”
(Interviewee G, personal communication, April 23, 2020).

As seen before, in the cross-case analysis, the participants from the supply side also mention that a separate focus is needed on the real estate demands depending on the size of the companies. The interviewee states that currently, there is a reasonable mix of single tenant and multi-tenant buildings at Schiphol, wherein the companies in the single tenant buildings usually have their own set of facilities, whereas, for the companies in the multi-tenant buildings, such as The Base, the focus is on proving the shared amenities and facilities, which the smaller companies cannot afford themselves.

There is also a higher demand for open office spaces, where the tenant prefers to have all their office space on a single floor, rather than being split at different levels, which plays an important role with flexibility. There is also a high demand for quality office spaces which can accommodate international level meeting, product presentations of scale, hosting clients, etc.

“I think we focus on them very differently. I think when you look at our portfolio, I think probably a pretty reasonable mix of, let's say, a single tenant that multi-tenant buildings. So the multitenant buildings obviously are more suited for smaller companies. So what we do there, for example, at The Base we really invest in the public spaces, in restaurants and seating areas for people to have lunch, the game room, the childcare. Those are all the same facilities that actually we sponsor them, to make the area more interesting for smaller companies that don't have all these amenities for themselves. Whereas, for example, companies like Heineken or Samsung, they have built in their own restaurants and their kitchens. But a lot of companies obviously don't have the possibility to do it. So that's why we invest in a lot of these facilities that are available for the entire community.

And we really try to focus them on certain areas, for example, we do it in The Base, in the World Trade Centre. We do it in Schiphol East because those are the areas where our real estate proposition is most interesting for smaller companies that don't have their own amenities.”
(Interviewee G, personal communication, April 23, 2020).

In terms of the different areas at the airport, Schiphol CBD consists of the knowledge corporations, which are a different area in terms of the types of companies and the office spaces they occupy, which is mainly based on their less intensive travel requirements. Schiphol CBD currently has an occupancy rate of about 93%, which shows the high demand for offices there, and at the same time there is currently about 150,000 m² available space to further develop, on the other hand, Schiphol East can be seen as a more vulnerable area which needs further planning.

“[...] we still have a lot of space to develop new office spaces at CBD. I think we still have room to get in about 150.000 square meters. Obviously, that's just, future development potential and not buildings we have at the moment. I think at the moment, our occupancy is 93%. So, we don't have a problem. The CBD is quite solid, I think that there's not a lot of concern there about vacancy.

Schiphol East is this a different story. It's actually before the Corona crisis, we had, I think about 90 % occupancy there as well. But this is typically a more vulnerable area. So when the market will be going down towards a recession, which we look to be heading now, Schiphol east is an area that we are more concerned about than CBD.”
(Interviewee G, personal communication, April 23, 2020).

Another important aspect is that one of the key demands from the corporations is an inspiring work environment that provides flexibility to accommodate the working style of the companies. With the ease of access at the airports, a number of companies prefer to have either their head office or satellite office there, which enables them to have staff meeting and share knowledge, with a demand of spaces that can be occupied for both, longer and shorter time periods.

"I think what is important is that one of the trends that we spoke about today is that you see from one hand if you see the workforce from this generation, Generation Y or Generation Z, is looking for good places to work that are not too long travelling from their house. That's their inner city or at hubs. We still are easily reachable and looking for some nice cool inspiring environments to work. On the other hand you see corporates which have a demand for talent. So they need to be at the best offices in nice locations to attract the talent.

So in that sense, the head offices or office buildings are becoming more and more satisfying or dissatisfying for employees. So the war for talent is going on. So the companies realize that they need to have the best office to attract the best workforce. So there can be really different strategy and fundamental for companies to think about where to locate their office building, whether or not they do that with an operator, and they also think about the function of the head office, do we really need a head office? Do we really need so much space or can we create an environment together with an operator. We want to make it better, make it more service minded and to also work towards flexibility. And in that sense I see a demand for better working environments and also the demand for companies to adapt to what the workforce needs. And we as an operator do exactly that, we try to bring those together."
(Interviewee E, personal communication, February 28, 2020).

Portfolio structure

The findings from the interviews show that at the airport, there is a demand for both types of offices, core and peripheral, the portfolio structure that the company decides to choose depends on a number of factors, such as the maturity levels of the company and if it is a Dutch or international company. For instance, Dutch companies that often have their core buildings in other parts of the country, look for a satellite or peripheral office at the airport for few employees who fly out frequently. But for certain international companies, where a number of employees and clients need to travel more often, their head offices are located at the airport.

"A lot of companies will create a spot to work either, the head-office or the coworking environment at those airports right. Because it's so easy to meet there with your clients and share things and have more of the staff board meetings there. I think just the importance of the airport just as train stations, will become increasingly more interesting for corporates to locate. It is interesting that in office space in general there will be an increasing demand for things to be at the airports."
(Interviewee E, personal communication, February 28, 2020).

"It's both. So some have their core office, their headquarters at Schiphol and some have their satellite offices. If the main office has based at a certain location for a long time, then they only put their satellite office at Schiphol, for the subsidiaries that have to travel a lot. If the whole company has to travel a lot, for instance, Samsung, Microsoft, then they have their headquarters at Schiphol."
(Interviewee F, personal communication, March 24, 2020).

Flexibility

There is a high demand for flexibility from the corporations, in terms of financial flexibility, flexibility in the type of space to be used and the amount of space to be used to upscale or downscale the office, and office suppliers should aim to cater to these demands. One of the participants also states that currently, 14-15% of the office spaces in the Netherlands are offered as flexible concepts, which shows a mismatch with relation to the demand side. With the locational advantages attached to the airport location, it shows an opportunity to further explore this market and incorporate flexible working options.

"[...] I think there's like I said there are about 75 concepts in the Netherlands alone that are coworking. So there's a lot of competition but still only in the Netherlands about 14-15 % of all office space is flexible, so there's 85 percent of stuff to go.
(Interviewee E, personal communication, February 28, 2020).

On the other hand, as Schiphol Real Estate works as an investor-developer, the primary focus is on stable cash-flows, and thus deviating from the traditional business model and working towards providing flexible options is not necessarily the most attractive option. But, with the growing trend towards flexibility, SRE, does recognize its importance and has thus partnered up with other co-working providers, such as Space, Regus and Nest. They aim to incorporate financial and spatial flexibility in their business model and to capture different sectors of the market. Currently, SRE has introduced certain data-driven initiatives, such as 'Spacemaker' and 'Parkflex', which allows third party companies to utilise meeting rooms, other spaces and parking, which are not being used by the host company on a temporary basis.

"[...] That is mainly data-driven innovations. We've seen that some companies don't use their space as much as they can. And we always try to find out where this space is, so we put in sensors in the building and then we based on the data we will discuss with the tenants, that the occupation of your office is not as much as you can use. You could optimize it. And there is a possibility to optimize it using third parties like other tenants and the same goes for parking. So we try to offer all our clients some flexibility based on data and we try to see some trends in their use. So for some of those buildings meeting rooms are not being used on Fridays and start-ups can rent space for attractive prices only Fridays and they will use that because they're more flexible. So here you can see that we can optimize the use of the square meters at Schiphol and also parking spaces."
(Interviewee F, personal communication, March 24, 2020).

Lastly, another findings from the interviews shows that the flexibility demands of the tenants also depends on the maturity level of the companies. In this, the smaller and younger companies look for more flexible options with their growth being uncertain, and the bigger and more mature companies usually have more stable working patterns and might be more hesitant to enter into flexible lease contracts.

Challenges

Firstly, Schiphol as a location is unique, in which due to the limited space available at the CBD, finding the right partner and the right location can be challenging for an office provider. At the same time, because of the airport location, there are a few guidelines that need to be complied with, such as the security guidelines, the building material, etc., which tend to delay the development process.

"It's very difficult to get a good spot at the airport and [...] we have been working since 2012 at creating a joint office space. And ultimately it worked out and we started in 2018 at developing or redeveloping the [...]. But it took a long time. It's very difficult to get the right location and the right partners. Airport environment is a very limited space."
(Interviewee E, personal communication, February 28, 2020).

Secondly, with the difference between the appeal for different areas at the airport, Schiphol East can be seen as the more vulnerable area, as it shows less potential than the CBD, the aim is to attract quality tenants, rather than a large number of companies. Thirdly, a major challenge considered from the supply side is the mindset of the corporations looking to rent the office space. Even if Schiphol were to provide flexible working options, the tenants do not always recognise the added advantages and might not find it as an appealing option, thus it becomes a challenge to find the right tenants and cater to their individual needs.

Finally, in order to get feedback from the tenants, SRE have property managers assigned to the buildings who are responsible to get the feedback and attend to the problems of the tenants. The challenge here is that certain tenants can be more demanding than others, and there is no strategy in place to tackle this challenge.

“So our influence is mostly that when there's a complaint about building, they come in contact with us and tell what needs to be done or when the rent is going up, that kind of stuff. Then they come and discuss with our property managers.”
(Interviewee F, personal communication, March 24, 2020).

Opportunities

Currently, SRE is working on developing a 'Test Lab' in Schiphol East, which is a shared initiative between Schiphol and the aviation industry, with the aim to partner up with universities and innovative companies to make it an innovation hub for the aviation industry. This presents an opportunity to increase this interaction between the research and practice fields in other sectors as well and create an atmosphere to stimulate the generation and sharing of knowledge, and thus provide facilities that can push in this direction.

“And at Schiphol East, we are now actively busy in the development of what we call the Test Lab, which is really a shared initiative between Schiphol and other companies in the aviation industry and with the aviation economy from the University of Amsterdam, so the Aviation Academy. So that is where we would like to transform Schiphol to sort of the innovative hub more specifically geared towards the aviation industry.”
(Interviewee G, personal communication, April 23, 2020).

Another opportunity lies with having different development plans for Schiphol CBD and Schiphol East. This includes providing different financial flexibility options in both the locations, which will help the tenants and the landlord, in that, having a more flexible business model can help to accommodate more clients without having to build more and thus increase the 'per square meter' value of the buildings, and utilise the space in an optimal manner, depending on the demands of the tenants.

“And we are able to give them extra office space in periods where they are very busy. I think we could probably actually increase the value per square meter that we are able to charge to clients. We could also accommodate more clients at the same time than we are able to now. So this is one of the things we are working out to see if we can come to a model where we increase the value for ourselves and for our clients without having to build new buildings.”
(Interviewee G, personal communication, April 23, 2020).

Conclusions

The combined findings from the supply side show that Schiphol functions as a hub location, similar to Amsterdam or Utrecht, with the added advantage of multimodal accessibility. The supply side recognizes the varying real estate demands of the companies, mainly based on the size of the offices they occupy, which influences their usage of the shared services and facilities. As Schiphol Real Estate works as an investor-developer, their main focus is on offering long term contracts for their buildings and land assets, but with the changing times, they recognize the importance of flexibility and have been offering certain shorter term contracts. At the same time, SRE has taken up certain data driven initiatives to promote the flexibility among its tenants and to utilise the space in an efficient manner. Finally, there is an equal mix of core and peripheral offices at the airport, and the supply side aim to cater to the demands of both types of portfolio options. These aspects have been displayed in figure 31, under the theme of 'Airport Office location', and how they function within the theoretical framework developed previously.



Figure 31. Combined findings from supply side (centre column) in the theoretical framework (own illustration)

04 Combined Findings: Expert Opinion

In order to supplement the findings from the case studies and the interviews from the office providers, a third set of interviews are conducted with experts from the field. The aim of these interviews is to validate the findings from the previously held interviews and also to identify any new aspects in relation to the topic. This included three interviews, firstly, with an expert who has been involved in a number of office transactions in the Schiphol area, and secondly, with two experts working in the research field of Airport Cities across the world. These interviews were also based on the same themes identified previously and their combined findings are presented below.

Location decision and motivation

As mentioned previously in the demand side case studies, and the supply side interviews, the existing infrastructure facilities at Schiphol is one of the most important factor for the corporations to locate there, this includes the connectivity provided by multiple ways of transportation including air, rail and road. For a business location, certain anchor tenants are usually needed to attract other corporations and set up a business community, in the case of Schiphol, the airport acts as the anchor tenant. The accessibility to the air travel facilitates companies to host a number of international clients and customers, which attracts not only some of the larger companies, but also small and medium enterprises. Schiphol's geographic position in the Randstad area enables quick and easy accessibility from all parts of the country, which helps the companies located there to draw on an employment pool from throughout the country, which is considered a distinct advantage from other business locations in the country.

“Schiphol all has certain key advantages that distinguish it from other airport cities. Number one is geography, the fact that it's located at the centre of the Randstad, and that's something that's very difficult for, let's say, other airports to replicate. So the fact that you are so quickly, basically anywhere in Holland. And the fact that you can draw on an employment pool from, you know, in theory, pretty much almost any part of the country is a distinct advantage. The second one, of course, is that you have a lot of companies there who either their employees are engaging in a lot of international air travel themselves or they maybe are hosting a lot of clients from abroad.”
(Hirsh, personal communication, April 28, 2020).

“The connectivity by air, and also highways, trams, buses and stuff like that. So the land connectivity is extremely good. That means that if you have an airport without any commercial real estate and you start thinking about, OK, I want to develop this business area or this office area, then usually you will have to develop an area and start building roads and tram lines. But at Schiphol, it's already there. So it's actually making use more efficiently of existing assets.

Usually if you develop a business area in the middle of nowhere, then you are searching for your anchor tenant. And based your anchor tenant, you can start building and you can start maybe adding some facilities and amenities. While at the airport area, there is already an anchor there- that's the airport, and some companies associated with it. So actually, you have a jump start for your commercial real estate. So, that's the main reason.”
(Van der Horst, personal communication, May 1, 2020).

The culture of the company also plays an important role in this decision, in that, corporations with a more open culture and those that employ highly trained professionals are also attracted to Schiphol due to its vibe.

Apart from the general factors, the location decision is also based on the size of the companies.

- For larger companies

The larger tenants such as Microsoft, Samsung and Cargill are usually self-sufficient, i.e., they have a number of in-house facilities and meeting spaces. For them the shared services provided by Schiphol are an added advantage which promotes the attractiveness of the area, they are primarily focused on the accessibility requirements of the company. These companies follow a structured approach for the acquisition of the office, that they usually hire an advisor that takes into account a set of user preferences that include accessibility, parking ratio, quality of the workspace and rent levels.

- For smaller companies

For the tenants that occupy smaller offices, the concept of the serviced office space, such as the World Trade Centre, is more appealing with all the shared facilities and amenities supplied by the office providers.

“So I think those large companies in general, hire an advisor and take into account different criteria such as accessibility, parking ratio, rent level, quality, amenities. So for them, it's more a rational process. I mean I think in all cases they already had Schiphol in their mind as being a suitable location. So again, it is the difference between the large companies who have a professional and structured approach for the acquisition of the space and the smaller companies who are probably already familiar with the World Trade Centre and especially want to be there because of all the service and the amenities which are provided.”
(Interviewee H, personal communication, March 19, 2020).

Lastly, another important finding is the effort that is put in by the airport authorities in creating a business community at Schiphol, this includes not only the physical facilities provided, but also the communal facilities that create a business community which is inclusive through a number of ongoing events and networking opportunities, which is different from other business locations.

“But I would also add, a third one, which I think is quite important, and that is the level of effort that the airport has put into creating kind of a business community at the airport through things like The Spot Community, for example. And so I think that, the fact that they're not just providing sort of physical facilities, communal facilities, but also sort of community ongoing events, networking opportunities, that sort of thing. I would flag that, as you know, really that distinguishes it from an office park where maybe you don't know any of the other companies located there.”
(Hirsh, personal communication, April 28, 2020).

Business model

Currently there are two separate real estate markets at the airport, the aviation related, for which their business depends on the air-side developments, and the non-aviation, for which being at the airport is about the convenience and not about their core business. The dependence of the commercial real estate developments on the aviation cannot be defined as a one sided development, on one hand, people do not go out of their way to visit the Schiphol plaza, and on the other hand, the footfall provided by the transport hub at Schiphol creates opportunities and makes a number of aspects economically viable.

“There are actually two real estate markets happening at an Airport city. And one is more aviation related and the other one is not aviation related. And the not aviation related is more the commercial companies. For example, at Schiphol you have Microsoft, Samsung, some real estate development companies and retail companies and stuff like that. And they don't have to be at the airport. For their business, it's not important for them to be there. They can have their headquarter anywhere. But they chose it because they think it's convenient. And it does help. For Microsoft, for example, they get more than one hundred visitors a day that use the airplane. So for them it's really convenient if those people come to them and they can just walk over to their office from the terminal. So for them, it's convenient. But they know they can go anywhere else and still have the same turnover for the company.”
(Van der Horst, personal communication, May 1, 2020).

The current business model followed by SRE, which focuses on providing the 10 year lease contracts can be seen as a beneficial model for the airport authorities, in that especially with the 95% occupancy rates for offices in the CBD, the 10 years contracts provide security even in uncertain times. At the same time, moving forward and with the modern way of working, certain flexibility aspects will become important, which will need to be incorporated in the working system of Schiphol Real Estate (Van der Horst, personal communication, May 1, 2020).

Real estate demands

As seen in the market today, there is a high demand for serviced office spaces, especially where the operators supply conference spaces, meeting rooms, lounge space, coffee bars, especially for companies that are too small to provide these facilities themselves, and also helps in attracting talent by offering an attractive workplace. With these facilities being provided in a public area, the real estate demands of the corporations change accordingly, in that sense, even the larger tenants prefer to occupy spaces in multi-tenant buildings where they have the opportunity to share the services and not bear the cost of them individually.

“That's a very popular and increasing demand for managed business spaces. We have a lot of tech companies who demand the serviced office space, especially the ones who are opening their new offices or need more space in Amsterdam, for example. And then the serviced offices are great alternatives for these companies also because of most of those operators supply conference space, meeting space, lounge space, coffee bar and typically they are too small to sort of facilitating themselves, such as those in the World Trade Centre. So they like to be in a building where the landlord or the business centre will provide the services. And it's an important part of the marketing and a trend. It's something you really need to have. This is also a thing that a lot of employers use to attract employees. So it's part of their talent search program, offering attractive space and attractive services. And for the smaller companies, the business centres are a great alternative. There is a great demand for that.”
(Interviewee H, personal communication, March 19, 2020).

“And so this is also a little bit about creating a community and attracting people. And some people asked me in the beginning is it free for me to use this, but because I don't rent space here. I said it's public space, so you can do whatever you like. Now, if you go here and you order coffee, we're happy you're here. So that's the whole thought behind it. So I think also in creating an open atmosphere, offering these services and allowing people to use stuff like that, that also attracts some companies and probably makes that choice in between either a single-tenant space, like Samsung or a multitenant and serviced offices that are mostly in the WTC. So there's still a lot of options in between.”
(Van der Horst, personal communication, May 1, 2020).

Another finding shows that the real estate demands also depend on how client-facing the company is, and how much face-to-face interaction the company requires. This in turn affects the locational requirements, and determines the decision of the company to locate in the CBD or in Schiphol East. Along the same lines, the culture of the company and the maturity levels also play an important role in this. For certain companies, close by areas such as Hoofddorp also serve as efficient alternatives, especially for the single-tenant buildings where the rental prices are lower compared to the Schiphol CBD (Hirsh, personal communication, April 28, 2020).

Finally, it is also important to mention that Schiphol has managed to create a more ‘walkable’ environment for the business location, in that they cater to the work-life balance that the knowledge workers demand, by providing a number of facilities which are open to the public. At the same time, special attention has been given to the width of the floor plans, which corresponds to the current ways of working in the office, and enable more flexibility, this aspect cannot be pinned down to the concept of an Airport City, rather to the modern way of working for companies (Interviewee H, personal communication, March 19, 2020; Hirsh, personal communication, April 28, 2020).

Portfolio structure

The concept of the Airport City presents opportunities for both, core and peripheral office spaces, as seen in line with the supply and demand sides at Schiphol, which has an even mix of both the portfolio settings. A number of corporations, that have their headquarter/ core buildings in another city in the Netherlands, usually set up a satellite office for the branch of the company that involves a significant amount of international travel. At the same time, there are also corporations that prefer to locate their core buildings at the airport. For the corporations to set up their peripheral offices, they look for partnerships with serviced office providers in multi-tenant buildings which gives them the option to share the additional services.

“Well, in theory, I think it could be both. If a company who had their main headquarter or the main campus in Utrecht or Rotterdam could have a satellite office at Schiphol. Also when they are international and fly out to other countries, then it makes sense to have a satellite office.

I'm sceptical about corporates opening their own satellite offices in the province outside Amsterdam, I think most of them will choose for a partnership with the business centre or for memberships or opportunities to use that space when they need it. So I don't think there are many corporations out there who hire their own conventional office space for a satellite office in the province, I haven't seen it. I'm not familiar with that.”
(Interviewee H, personal communication, March 19, 2020)

Having either their core or peripheral office at the airport is usually deployed as a cost saving and an added convenience measure by the corporations, wherein either the employees who work in the core portfolio have more intensive travel requirements, or a certain department of the company has the travel requirements and are thus located at the airport (Hirsh, personal communication, April 28, 2020; Van der Horst, personal communication, May 1, 2020).

Flexibility

The findings from the experts opinions aligned with the findings from both, the demand and supply sides, in that, having financially flexible options is seen as highly attractive for the companies and number of the tenants would be willing to pay additional charges for it, if it fits in their accommodation strategies. Especially for the knowledge corporations, that have a large number of mobile workers, having financial flexibility paired up with spatial flexibility can help them optimise the use of space and attract more companies to the airport location.

With a general trend towards digital transformation and mobile workplace options, the demand for flexibility increases wherein the staff levels can be accommodated as per the requirements of the company. Also, it is important to see that the flexibility options seem to work with the serviced office spaces and with the shared facilities offered, which has the potential to attract satellite offices to the airport (Interviewee H, personal communication, March 19, 2020; Hirsh, personal communication, April 28, 2020).

“We did see that there is more need for flexibility. What we have seen is some companies coming actually to the airport at first, also looking into a flexible kind of workspace, so with Spaces, Regus or WeWork. LinkedIn is a good example, LinkedIn started in the Netherlands and had its European HQ in the WTC. So they used a completely serviced office, because they wanted to be set up quickly, they knew they would be relying a lot on LinkedIn who probably had to fly in. So they had to fly in a lot of people at first, to start up everything.”
(Van der Horst, personal communication, May 1, 2020).

Spatial proximity

According to the experts, and as seen through the demand perspective, in practice the spatial proximity to other companies does not essentially contribute to the business of the corporations and is not a part of their user preferences. It is about the mindset and the essence of belonging to a business community. At the same time, in the case of start-up and incubators, the companies prefer to be close to a number of other corporations to increase the interaction and look for new opportunities, but in the case of mature companies, there is no evident interaction with others located close-by.

“I’m a little bit sceptical about that. I think that’s a nice story, a good marketing story but I think in reality it does not happen. I think the majority of companies are working on their own. And of course in business centres, a number of smaller companies start working together or exchange knowledge. For the majority of the companies that’s not the goal to be in a certain building with others.

But, that might be different in an incubator or a start-up or a building with start-up companies that might be different. But for mature companies or companies who are in the second stage of their existence, or are in the process of becoming a mature company, I think they concentrate on their own business and I don’t think the choice of their location of office space is dependent on working together with the other companies.”
(Interviewee H personal communication, March 19, 2020).

Challenges

One of the main challenges identified from the experts interviews was the difference seen between the Schiphol CBD and Schiphol East. Currently the demand for the office spaces at the CBD is quite high when compared to the East, and for both the areas to be successful, there are certain aspects that need to be improved, including the public transport facilities, the shared amenities and the overall quality of the area. Thus, having unique selling points for the East can help to attract more companies and make the area more successful (Interviewee H, personal communication, March 19, 2020; Van der Horst, personal communication, May 1, 2020).

Schiphol also faces challenges from the nearby locations such as Hoofddorp, which also acts as a competitive alternative for some of the mature companies to locate there. For companies occupying a large footprint and prefer to locate in single tenant buildings, Hoofddorp proves to be an option, with its lower rental levels and short travelling time to the airport.

Another important point mentioned is that with the CBD located close to the airport terminal, the future of the commercial office area depends on the future plans for the airport. The restrictions imposed because of the airport cannot be challenged by the real estate developments and the future plans need to be worked around it. With the flexible and mobile ways of working gaining popularity, companies might look to reduce their total occupied footprint, which leaves Schiphol with the challenge to put in place other facilities and uses which can be used by the tenants.

“If it becomes the case that companies are sending or requiring fewer people to be physically present at any given time. In principle, yeah, they would need a smaller footprint. The question is, would some of that footprint be taken up by new kinds of facilities? So another thing that I could definitely see happening moving forward is that the travel managers and companies are going to become a lot pickier about approving peoples overseas flights. And so what that would mean is like you would need way better facilities for, you know, doing meetings remotely. So there is a way in which certainly the programming or the functions may change. Now, whether that leads to a quantitative reduction, I wouldn’t at this stage feel comfortable commenting on that.”
(Hirsh, personal communication, April 28, 2020).

Opportunities

As mentioned by one of the participants, the identity of Schiphol as a business location depends equally on the aviation side, wherein the combination of the accessibility and the real estate developments at the airport needs to be of the top quality for Schiphol to keep working as a business location. With an increased potential for the

knowledge workers, who interact with other knowledge corporations, the airport attracts international companies with a more open culture and the desire to use the shared facilities offered.

"[...] they chose Schiphol because of the accessibility and the services and amenities. So in order to remain attractive, they need to make sure that the accessibility is 100%, that the services are great and Schiphol as an airport needs to be attractive. If there are no flights to the U.S. anymore, for certain companies there's no reason to be there, then they would be in the city centre. So there needs to be a good airport, aviation-related, and it needs to be a good place for companies to stay for their office space. It's a combination that needs to be 100%, need to be top in order to be competitive, because the competition will not come from outside Holland, I don't think so."
(Interviewee H personal communication, March 19, 2020).

There are certain missed opportunities at Schiphol, including a potential to bring together research, education and practice, and thus promote the knowledge economy, as seen in some of the other Airport cities around the world, such as in Munich and Singapore. Another aspect for the airport authorities to focus at is the reuse and redevelopment of the existing facilities. With the worldwide focus moving towards decarbonisation, an immense potential lies with combing it with digitisation and changing the mindset of the authorities to move in that direction.

"[...] And I think that's a bigger challenge. I mean, I think there's sort of two larger sort of big picture transformations that are going to affect airports and also, you know, airports cities in the next years. And that's basically digitalization and decarbonization. And so I guess the question would be, you know, how do you bring both of those into your sort of, let's say, financial models and figure out a way to pay for it, basically."
(Hirsh, personal communication, April 28, 2020).

Having a different flexibility approach for Schiphol CBD and East, not only in terms of the financial aspect, but also spatially can also be explored by SRE. With the high occupancy rates at the CBD, different flexibility options can be tried in the East, along with partnering up with serviced office space providers, which also gives the opportunity to explore different work styles for the corporations, who can also use these offices for different purposes, such as for temporary accommodation, expansion, shrinking or even moving to a new location (Van der Horst, personal communication, May 1, 2020).

Conclusions

The combined findings from the experts' interviews show that the multimodality of the Schiphol Airport and the accessibility provided by the existing infrastructure facilities attract a number of corporations to locate there. The findings also align with the previous interviews with the supply side, in that the real estate demands of the corporations are primarily influenced by the size of the companies, and there is an increasing demand for serviced office spaces, wherein the office suppliers provide shared facilities and services. At the same time, the views of the experts align with those of the demand side on the topic of spatial proximity in saying that the corporations do not necessarily interact with other companies around them, but it is relevant to being a part of a business community at the airport. Also, as seen in the previous sections, there is an increasing demand for flexibility in terms of the lease contracts and the office space offered, and it shows immense potential for Schiphol to explore as an office provider. Finally, although there are a variety of corporations located at Schiphol, with their core and peripheral offices, and their demands influenced by the nature of the work at the company, their maturity level and the company culture, most of the experts expressed a move towards more peripheral spaces, especially with corporations partnering up with other service space providers. These aspects have been illustrated in figure 32, under the theme of 'Airport Office location', and how they function within the theoretical framework developed previously.

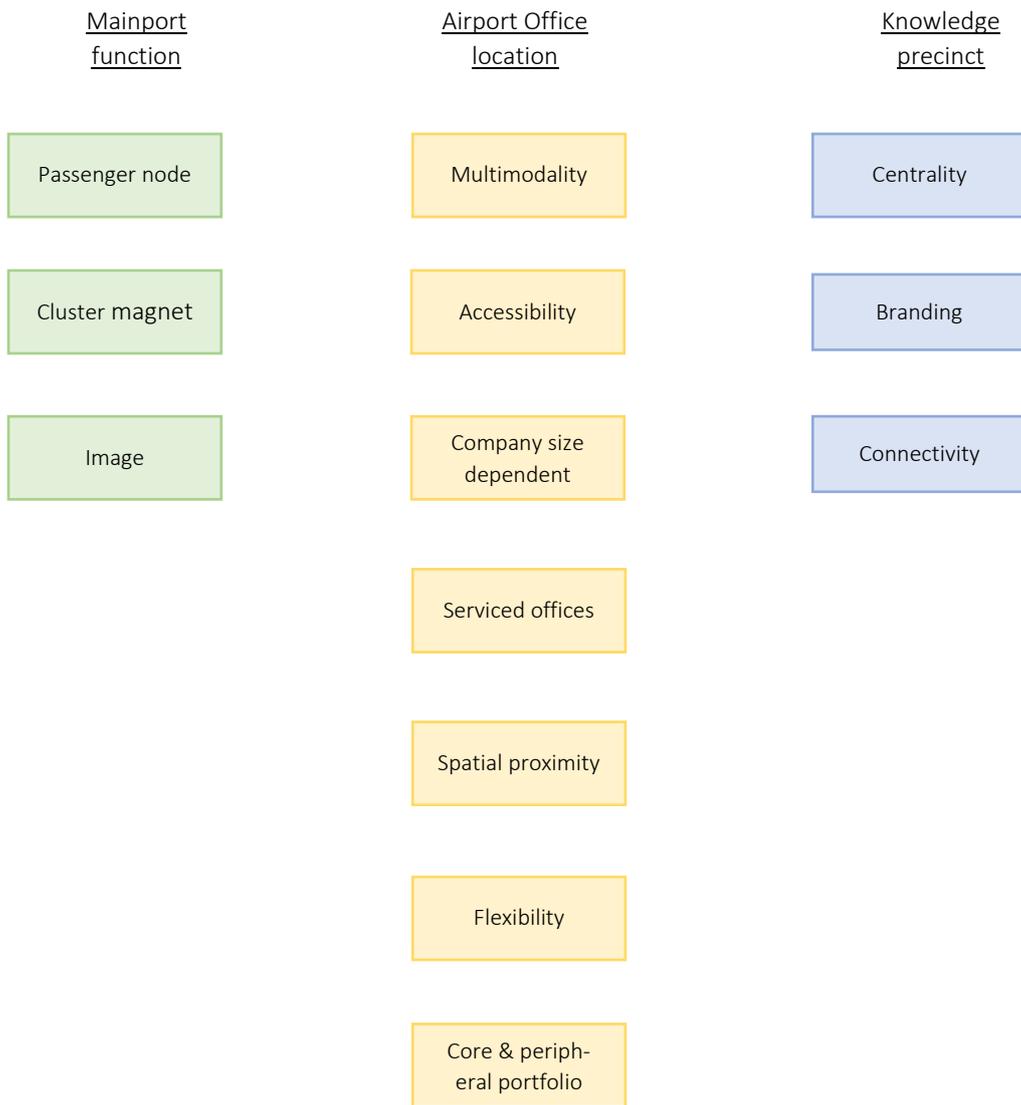


Figure 32. Combined findings from experts opinion (centre column) in the theoretical framework (own illustration)

V. Synthesis

01 Aligning findings from the Demand, Supply and Experts perspectives

This section aims to confront the findings from the demand, supply and expert sides at the Schiphol Airport, based on the previously identified themes and sub-themes in figure 19. As seen below in table 7, the various aspects associated with the ‘Airport Office location’, that have been previously identified through the demand, supply and expert studies, have been mentioned, along with depicting whether those aspects were present, partly present or not present for each of those perspectives. At the same time, the table also shows whether the specific aspects have a match, mismatch or semi-match between the demand and supply sides, which helps to gain a deeper understanding between these perspectives and formulate strategic recommendations.

Airport Office location	D	S	(Mis) match	E
Location decision, motivation				
Hub function	Present	Present	Match	Present
Strategic location	Present	Not present	Mismatch	Not present
Multimodality	Present	Present	Match	Present
Accessibility	Present	Present	Match	Present
Real Estate aspects				
Collaborative working	Present	Not present	Mismatch	Not present
Serviced offices	Present	Partly present	Semi-match	Present
Company size	Present	Present	Match	Present
Shared facilities	Present	Partly present	Semi-match	Not present
Flexibility				
Financial	Present	Partly present	Semi-match	Present
Spatial	Present	Partly present	Semi-match	Present
Spatial proximity				
Community vibe	Present	Present	Match	Present
Smart Airport City				
Smart tools	Present	Present	Match	Present
Portfolio structure				
Core/ Peripheral	Present	Partly present	Semi-match	Present
Functional use	Present	Not present	Mismatch	Not present
Additional aspects				
Relational proximity	Present	Not present	-	Not present
Talent attraction	Present	Not present	-	Not present

Legend

Present	Present
Partly present	Partly present
Not present	Not present

Perspective	
D	Demand side
S	Supply side
E	Expert view

Table 7. Matrix showing the alignment of the main aspects of an Airport Office location with the demand, supply, the alignment and the expert perspective (own illustration)

Location decision and motivation

As seen in the empirical research and table 7, the location decision and motivation of the demand side depends on all of the identified aspects, in that, it is important for the corporations that Schiphol serves the hub function and is thus, chosen as a strategic location, which provides accessibility to their customers and employees through the multimodal modes of transport available. At the same time, for the supply side it is important that Schiphol continues to serve its hub function through the various modes of transportation such as air, rail and road, and maintain the quality of the infrastructure facilities provided, which creates a continuous flow of people through it and thus, attracts numerous companies to locate there. At the same time, providing accessibility to different sub-markets within Schiphol, the CBD and East, is also crucial for the supply side, for corporations to locate in both the areas. This shows a match between the demand and supply side in all the aspects, except for the aspect of the strategic location that holds importance mainly for the corporations, as compared to the suppliers. This is also agreed upon by the experts, who state that the quality of the business location at Schiphol is highly dependent on the supporting infrastructure which acts as the main pull factor to the airport, and enables its hub function.

Real Estate aspects

Table 7 shows that, the real estate aspects depend on a number of factors for the demand side, such as the style of working at the company; as seen through the demand study, corporations are adopting a more collaborative style of working at the airport, with their customers and partners visiting the office frequently, thus, there is a higher demand of meeting rooms, interaction spaces and employee training centres. At the same time, the size of the company, along with the high demand for serviced office spaces and the preference for using shared facilities and amenities determines their real estate demands. On the other hand, from the supply perspective, the office providers mainly cater to the demands of the companies based on the size, which then determines the demand for serviced or self-managed spaces and the needs of the company to utilise the shared facilities. Figures 33 and 34 illustrate the different serviced office spaces available in Schiphol CBD and Schiphol East, respectively, which are mainly operated by external providers (a detailed list of the offices is shown in Appendix G). Comparing the empirical findings, shows a mismatch in terms of providing collaborative space solutions by the office suppliers; also with Schiphol moving towards offering more serviced offices and shared facilities, it shows a semi-match between the supply and demand sides for the respective aspects. This aligns with the experts' views, in that they lay emphasis on the company size and the growing demand and the availability of the serviced offices at the airport, which influences the real estate portfolio.

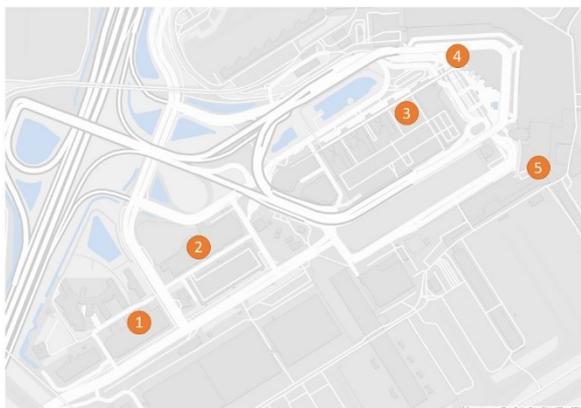


Figure 33. Serviced offices in Schiphol CBD (own illustration)

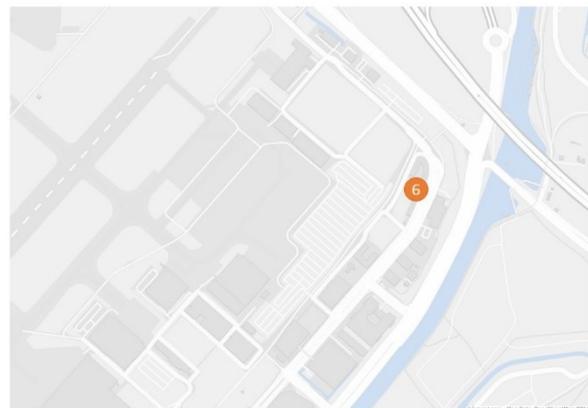


Figure 34. Serviced offices in Schiphol East (own illustration)

Flexibility

Moving onto the flexibility aspect, there is an emphasis laid on this from all three perspectives, the demand, supply and experts. As seen in table 7, having financial and spatial flexibility is seen as a highly attractive option for the corporations, as this helps them respond to some of the uncertainties faced by the company in terms of the duration of the lease agreements and the amount of office space required in the future. Currently, Schiphol is implementing certain flexibility initiatives which enables corporations to utilise the office spaces on a temporary basis, along with providing short-term lease contracts in serviced offices; which shows a semi-match between the demand and the supply sides. Providing financial and spatial flexibility is also seen as a favourable move for the supply side, as it increases the value per sqm of the office space, and helps to attract more tenants and maintain high occupancy rates, even in times of uncertainties and market slumps. This aspect has been highly emphasized by the experts as well, who state the need to move further in this direction and to compete with the other real estate options available in the market.

Spatial proximity

As seen in the literature review (in Chapter 2), spatial proximity has been described as one of the primary aspects needed for the sharing and generation of knowledge in a knowledge precinct; in contrast to this, the corporations from the demand side do not experience significant knowledge sharing by locating close to other companies, it rather gives them a sense of belonging to a business community. At the same time, they define spatial proximity as the ease of access to their clients and partners at other business locations through the accessibility provided at Schiphol. For the supply side, although there is no direct relation seen with the aspect of spatial proximity and it does not necessarily affect the office providers, Schiphol Real Estate has implemented a program called the 'Spot Schiphol Community' which is an online and offline platform that brings together numerous companies of varying sizes and expertise to form a part of a single business community (Schiphol Real Estate, n.d. -b). This shows a match between the supply and demand sides, wherein a move to support the community vibe at Schiphol is implemented. As seen from the experts' views, which aligns with that of the demand side, in general, corporations do not benefit in the knowledge generation and sharing process from being located in close proximity to others, it relates more to their mindset of being located in an emergent business location, such as Schiphol.

Smart Airport City

Looking at the Smart Airport City, deploying smart building tools is considered important for both the demand and the supply sides, as it helps the corporations to monitor the use of energy and create a healthy work environment for their employees. At the same time, for the office providers at Schiphol, the smart building tools and data-driven initiatives help them to utilise the available space in an optimal manner. With both the sides pushing for digitization and the use of smart building tools, a match can be seen with respect to this aspect; at the same time, it has also been highlighted by the experts, as one of the key areas of focus for the real estate at the airport for the coming years.

Portfolio structure

The portfolio structure of the office space at Schiphol is seen as one of the important factors for the demand side, in which they have either their core or peripheral office at the airport. At the same time, it is crucial to mention that these office spaces do not follow the objective definition of either the core or peripheral office space, but rather have a different function for different employees serving either the local or the international market. From the perspective of the office suppliers, they cater to the demands of the corporations, by providing office spaces that satisfy both, the core and peripheral functions of the office space, but currently, there is no specific focus on this aspect, and especially in relation to the functional use of the buildings. This shows a mismatch for this aspect,

as seen in table 7, and a further need for the supply side to focus towards it. As seen from the experts' views, there is a high demand for both the portfolio options at the airport, with companies looking for partnerships with serviced office providers to establish their peripheral or satellite offices.

Additional aspects

Finally, there are certain additional aspects which play an important role especially for the demand side, in which the airport office location contributes to increased relational proximity for the corporations as they interact and meet with their clients and partners more easily. Also, as mentioned by the corporations the urban vibe created at the Schiphol airport also plays an important role in the talent attraction and helps them in winning the war over talent for potential employees. These additional aspects are more focused towards the demand side and are not necessarily mentioned or considered influential for the supply side and the experts.

02 Comparing empirical findings with literature

After completing the empirical research, it is important to compare these findings to the theoretical framework that was previously developed at the end of the section 'Literature review' in figure 14. As mentioned before, a number of aspects of the 'Mainport function' and the 'Knowledge precinct' were linked to one another and complimented each other. As seen in figure 35, along with these two aspects, there is a third feature, 'Airport Office location', that was explored through the empirical research and relates to the locational and the real estate aspects of the offices occupied by the knowledge corporations at the airport.

Location Decision and motivation

Strategic location

Figure 35 illustrates that, a number of corporations chose Schiphol as a 'strategic location' for their office space for a number of reasons, Schiphol functions as one of the biggest passenger nodes and the image and reputation that it has as an international business location is important for the corporations. At the same time, this strategic decision also corresponds to how Schiphol is centrally located in the Randstad area and its connectivity to almost all parts of the country. Also, as Schiphol provides a large number of additional services and amenities, this strategic location also contributes to the learning and playing function of the knowledge precinct as the companies are able to cater to the work-life balance of their employees.

Accessibility

Next, the inland and international 'accessibility' offered at Schiphol with its existing infrastructure facilities is one of the most important aspects that influences the decision of corporations to locate there, while also contributing to the business generator aspect of the Mainport function.

Real estate aspects

Collaborative working

Knowledge intensive corporations are moving towards a more 'collaborative working' style, and Schiphol being a passenger node and a cluster magnet helps a number of clients and partners to access their office more easily and thus, work together with them and maintain relational proximity, while generating new businesses. The collaborative working also corresponds to the branding, connectivity and the learning and playing function of the knowledge precinct, in that the urban vibe created at Schiphol and the shared facilities offered help the corporations to move towards knowledge generation and sharing.

Serviced spaces

The increased demand of 'serviced spaces' and the need for using shared services relates to the passenger node and the cluster magnet aspect of the Mainport function in which corporations can utilise the services provided based on their specific demands, at the same time also contributes to the business environment at the airport. Offering serviced spaces also activates the learning and playing function of the knowledge precinct in that these cater to the varying demands of the knowledge corporations and their employees.

Schiphol in the knowledge economy

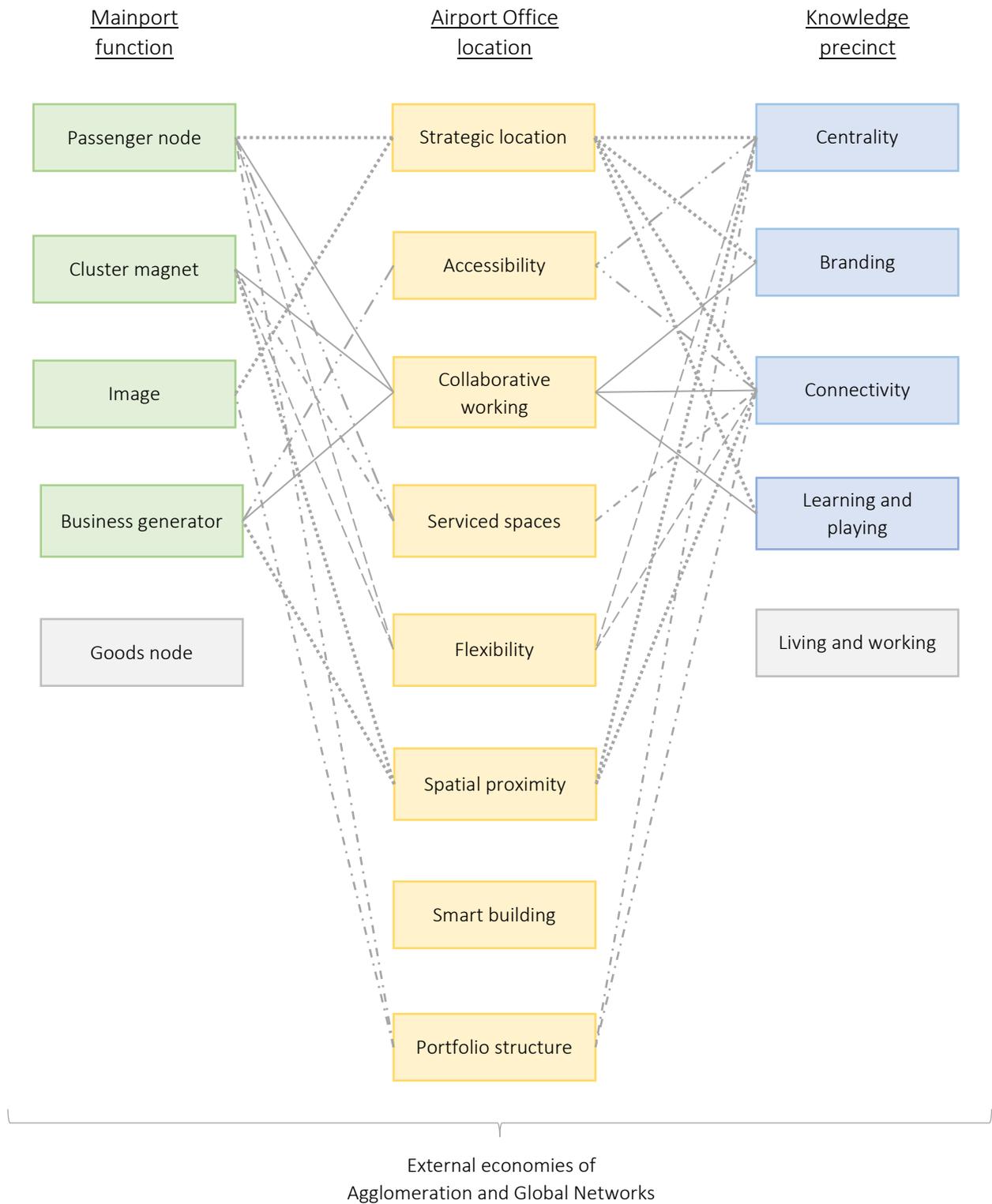


Figure 35. Interaction between the Mainport function, Knowledge precinct and the Office location at the Schiphol Airport (own illustration)

Flexibility

Next, 'flexibility', in financial and spatial terms, is one of the key concepts that emerged from the empirical research, and corresponds to the way a number of corporations want to move in the future. Having flexible options is beneficial for the supply and the demand side, as Schiphol Real Estate is able to capture the footfall that passes through Schiphol because of its function as a transport hub, and at the same time, as an office provider, they can serve a wide range of corporations and their individual demands.

Spatial proximity

With 'spatial proximity' regarded as one of the key functions needed for the generation and sharing of knowledge, the Mainport being a cluster magnet and a business generator relate directly to this aspect and create a business environment. At the same time, with the centrality and the connectivity aspects of the knowledge precinct also contribute to this aspect, in that it provides spatial proximity to other business locations with the various modes of transportation.

Smart building

Although the 'smart building' factor does not directly connect to the Mainport function and the knowledge precinct, it is one of the most important steps in moving towards an efficient utilisation of the available office space, especially with the limited space available in the Schiphol CBD area.

Portfolio structure

As illustrated in figure 35, the 'portfolio structure' of the office at Schiphol depends on the individual strategy of the company, currently, there is an even mix of core and peripheral offices at the airport, with the companies using it as a cost saving measure or as an added convenience for its employees. At the same time, the same office has a different functional use for different employees, in which the employees serving the Dutch market use it as a core location and those serving the international market and travel to Schiphol for shorter periods of time, use it as a peripheral office. This relates to the connectivity and the centrality of the airport, and the number of business personnel that pass through Schiphol, and also the image of Schiphol as an international business location.

Additional aspects

There are certain additional aspects such as the relational proximity and talent attraction, which correspond to the passenger node and the image aspect of the Mainport function and the centrality and the connectivity aspects of the Knowledge precincts. In this aspect, companies can maintain increased relational proximity with their clients and partner with Schiphol acting as one of the major passenger nodes that is located centrally and provides efficient connectivity to various business locations. At the same time, the image of the Mainport and the Knowledge precinct helps the companies locating there to attract potential employees and customers.

Finally, certain aspects of the Mainport function and the Knowledge Precinct, such as business generator and learning and playing, respectively, which previously did not fit in the profile of Schiphol acting as a knowledge precinct, can be now seen as working within the framework, wherein they relate to certain aspects of the Airport Office location, while considering the real estate demands and strategies. Thus, the three aspects of the 'Mainport function', the 'Office location' and the 'Knowledge precinct' working together give a deeper insight and understanding into the commercial real estate developments in the Schiphol area, and how Schiphol works in the knowledge economy as a business location.

03 Strategic Recommendations

As explained through the alignment of aspects between the demand, supply and expert study in table 7 and as shown in figure 36, using the triangulation technique, the findings from the demand side, supply side and the experts' opinions are put together, and based on their comparisons, certain conclusions and strategic recommendations for Schiphol Real Estate are formed. The final aim of these recommendations is to answer the third research sub-question, on how the real estate at Schiphol can facilitate the knowledge corporations.

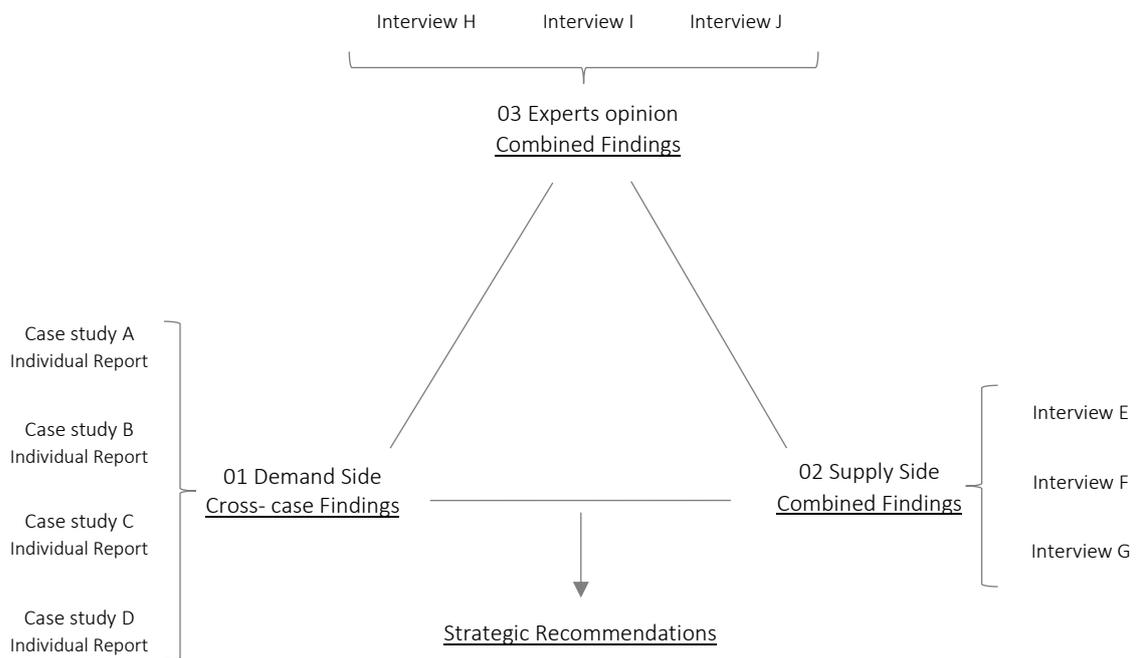


Figure 36. Triangulation technique used to compare the findings from the empirical research (own illustration)

6.1. A move towards flexibility

As seen throughout the empirical research, flexibility is one of the key topics addressed by all three perspectives—demand, supply and the experts. It is interesting to note that in the literature review, flexibility is not a topic covered by any of the authors, and can be seen as a gap that should be explored in depth. Currently, Schiphol Real Estate already has certain flexibility initiatives in place and recognises it's important for the future demands of the corporations, thus, the flexibility recommendations are addressed under two main topics, financial flexibility and spatial flexibility.

Financial flexibility

Having financial flexibility in terms of the lease contracts and exit options is seen as a favourable option for the tenants which gives them the opportunity to manage their office space during uncertain times. Although this does not necessarily fall in line with the current business model of Schiphol Real Estate, which focuses on long term leases and that provides security for the landlord, it is important to start moving in this direction to maintain pace with the various accommodation options in the market. This also presents an opportunity to attract first-time movers who are looking to explore the Dutch market to the Airport City, as they enjoy the accessibility provided by the multimodal infrastructure and also favourable real estate options which help them establish a foothold in the country. Although Schiphol has partnered up with few co-working and serviced office space providers, there is still scope to take a more active role in this process and even try certain in-house options.

Another opportunity lies with exploring a different approach for Schiphol CBD and Schiphol East, in which more financially flexible options, in terms of the lease contracts and exit strategies, are offered to companies in Schiphol East, and not the traditional 10 years long lease contracts. This proves as a marketing and promotional strategy to increase the number of corporations choosing for Schiphol East as a business location, and also eases the pressure on Schiphol CBD. This strategy proves to be beneficial for the landlord as well, in that it has potential to increase the value per square meter of the building, accommodate more companies and utilise the space in an efficient manner, without having to actually increase the footprint of the buildings.

Spatial flexibility

Financial flexibility needs to be complemented with spatial flexibility as this helps corporations cope with the times of uncertainty in growth by providing them options to expand or contract their office space. Moving in this direction has certain challenges in both single-tenant and multi-tenant buildings, in that for there might not always be room available for expansion in single-tenant buildings, but they have the scope to react to the spatial demands of another corporation and accommodate them on a temporary basis. At the same time, providing spatial flexibility in multi-tenant building has more potential to be explored.

With the high occupancy rates in Schiphol CBD, providing spatially flexible options can be explored in the East, especially as Schiphol East is sometimes perceived as isolated from the CBD due to its long distance and connections to the main terminal. This shows potential for development and flexibility for the upcoming construction to be done. Partnerships with other serviced space providers can be established, and that gives an opportunity to explore different work styles, in which companies can use these offices for different purposes, such as temporary expansion, buffer space, reducing the size of the company or even a permanent change in location. Thus, financial and spatial flexibility working in accordance with one another, as seen in figure 37, shows immense opportunity to cater to both, the demand and the supply side for the office real estate at the Schiphol Airport.

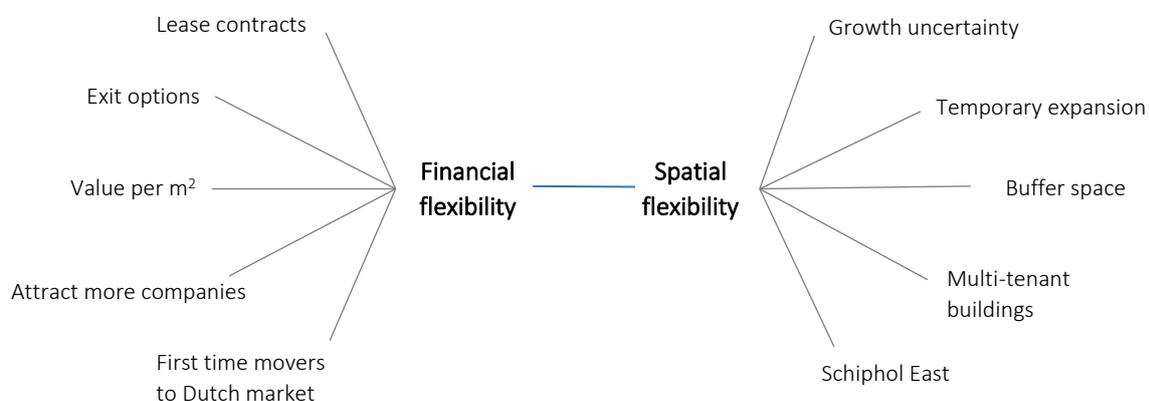


Figure 37. Strategic recommendation 1: Financial and spatial flexibility aspects for the office real estate at Schiphol Airport (own illustration)

6.2 Create Knowledge Hubs

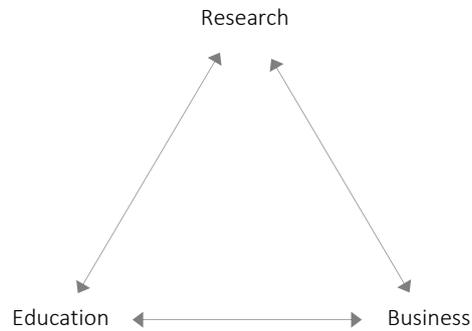


Figure 38. The 3 pillars for creating knowledge hubs
(own illustration)

With the emergent knowledge economy, it becomes clear that there is a need to bring together research, education and business, as seen in figure 38, and Schiphol as a business location presents this opportunity that needs to be captured. Some of the future constructions at the Airport City should be aimed towards creating buildings and areas that act as a buffer space between the three fields and brings them together, thus acting as the 'Knowledge Hubs', as seen in figure 39. These hubs function as the innovation centres at the airport, and provide shared facilities with a membership concept, wherein partnerships with universities, research companies and businesses can bring them all together under one roof.

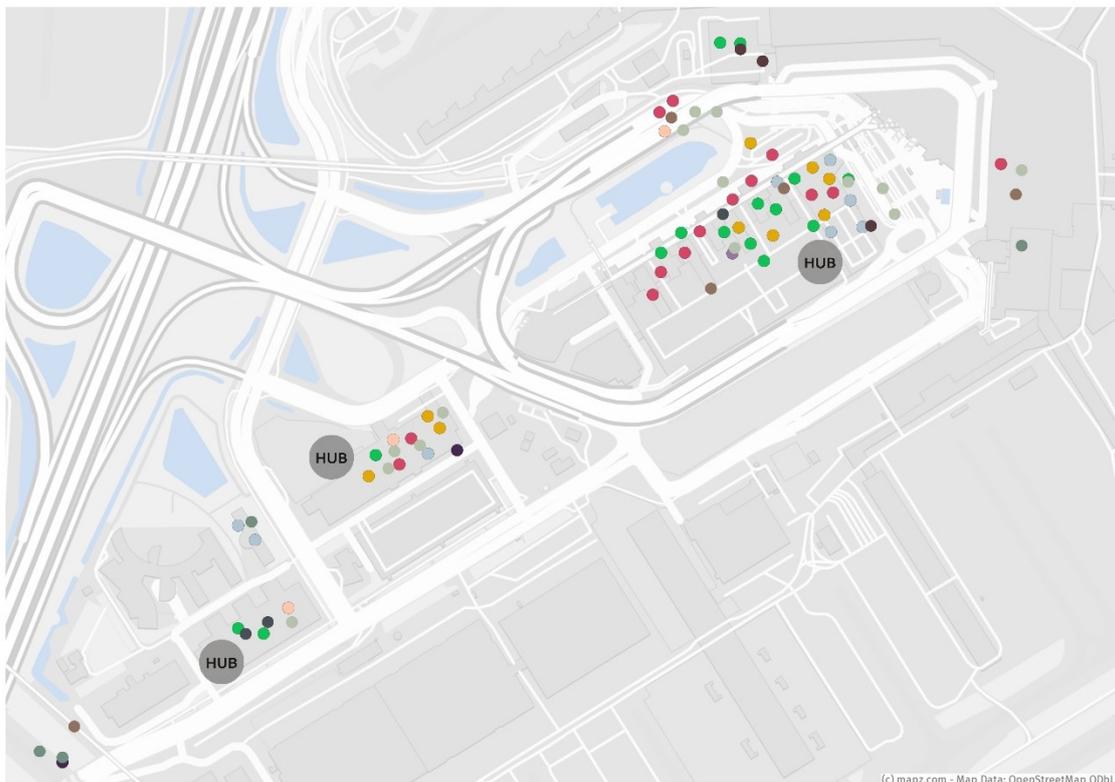


Figure 39. Strategic recommendation 2: Creating knowledge hubs in Schiphol CBD (own illustration)

Being a part of this initiative at the airport, gives the companies an opportunity to have direct interaction and increased chances of collaboration with students and researchers, and thus gives an upper hand in the war over talent. Schiphol understands the importance of these partnerships and is already looking to explore certain opportunities in Schiphol East for the aviation industry. But with accessibility and reach provided at the airport to a number of international and national business locations, and clients and customers, this strategy should be realised to its potential. These buffer buildings should be designed as highly agile, co-working spaces with minimum individual dedicated spaces to promote further interaction and communication among the people from the different fields coming together. Having such flexibility in the design of the space also gives a chance to change the functional usage of the building, depending on the future demands and without having to undergo any major renovations.

This strategy can also be deployed in some of the existing buildings, especially the multi-tenant buildings and without having to invest in new construction, to create such buffer areas that increase the occupancy rates and also help in the optimal utilisation of the available space. It is also important that Schiphol creates a number of these 'Knowledge Hubs', possibly in different scales, i.e., from individual buildings to smaller spaces in existing buildings, throughout the AirportCity which creates centres of interaction and thus promotes innovation. This can also be seen as a strategic decision by Schiphol, in that these hubs become the face of a new identity of Schiphol that actively promotes the interaction and sharing of learnings and business, and thus makes a strong move towards the knowledge economy, further contributing to the Mainport strategy of the Netherlands.

6.3 THE SQUARE 1, Schiphol East

Similar to THE BASE (as seen in figure 40) in Schiphol CBD, which acts an anchor building for that area, it is important that Schiphol East also has its own anchor building which brings together a number of employees and defines a new character of the area. Currently, Schiphol Real Estate is prompting Schiphol East as a business park where a number of plots are available for corporations to set up their office buildings and to be a part of the business community. Schiphol East has fewer number of tenants, more space available and lower lease prices, especially when compared to Schiphol CBD. All these factors present favourable conditions for Schiphol to implement a new concept in the East, called THE SQUARE 1, as seen in figure 41. THE SQUARE 1, which can be a multi-tenant building focuses on young companies and start-ups and provides the appropriate environment and real estate facilities, and works as an incubation centre for businesses. Providing a number a shared services and facilities, flexible working and meeting spaces, and even larger open areas equipped with smart tools for training employees and to be used as exhibition spaces, THE SQUARE 1 shows the potential to create a new identity for Schiphol East.

This new facility can attract numerous young and upcoming companies, and with the lower rent prices in Schiphol East, it provides the perfect opportunity for them to start their businesses. With the accessibility provided at Schiphol, the knowledge workers have flexible options to travel to their office location, where SRE can offer new methods of working that can be occupied on long-term or short-term basis. Also, as seen from the empirical research, these is an equal demand for both core and peripheral office spaces at Schiphol, with a global trend of corporations occupying more peripheral offices for at the airports (Hirsh, personal communication, April 28, 2020). Schiphol can promote corporations to have their peripheral offices in this facility, by offering short term contracts for companies to send their mobile workers with extensive travel demands, to operate from the airport and try new ways of working with a more flexible approach and shared use of spaces. It important to realise that this building can then act as a new landmark in Schiphol East, both architecturally and functionally, and thus creating its new identity. Working towards this will also reflect Schiphol's intentions to contribute to the knowledge economy, thus promoting and helping newer businesses and playing a proactive role in this development.

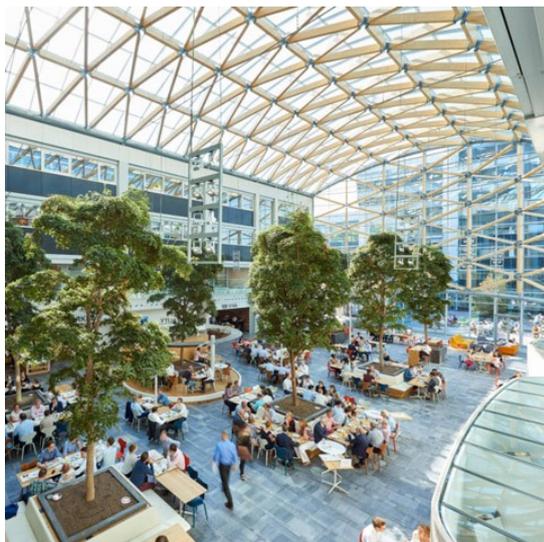


Figure 40. The Base building in Schiphol CBD (Schiphol, n.d.)

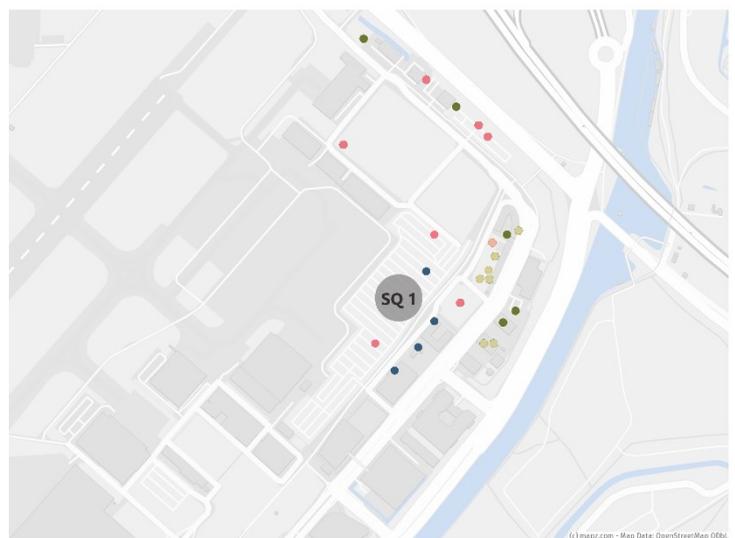


Figure 41. Strategic recommendation 3: THE SQUARE 1, Schiphol East (own illustration)

6.4 The 2-D's: Digitization and Decarbonisation

Through the empirical research, another strategic recommendation that comes forward is focusing on the 2-D's of 'Digitization' and 'Decarbonisation' for the Airport Cities. Schiphol can be seen as one of the pioneers in the field of the digitization at airports, wherein they aim to be the world's first Smart AirportCity, and have taken steps to move in this direction. In some of the recently developed buildings, these initiatives have already been deployed, with a number of sensors that are connected with building installations and are being used actively. Digitization helps not only to monitor the energy usage and maintaining a healthy environment in the buildings, but also ensures the optimal utilisation of unused or underused spaces. It is important for SRE to continue with their ambition and to find ways to install the smart building measures in the existing buildings, which also allows the users to find and use those spaces as per their demands.

Secondly, decarbonisation is a topic that has been highlighted by a number of researchers in the recent past, with a special focus on the airports and the aviation industry; there are certain steps being taken by the airport authorities that contribute towards reducing the overall carbon footprint, but these initiatives are mostly focused on the aviation side of the business (Hirsh, 2019). With this research focused on the office spaces developed at the Airport City at Schiphol, it is also important to extend this approach to the non-aeronautical business also. There are initiatives already deployed by the European Commission to move ahead in this direction, and containing guidelines for the energy use and the carbon production in the buildings, and also towards energy efficient building renovations (European Commission, 2019b). There are a number of already existing office spaces at Schiphol, and another important step in the decarbonisation process is to re-evaluate the use of these spaces and think about the adaptive reuse of these buildings, through as little physical transformation as possible. This step helps in optimising the use of the available footprint and resources. Thus, a combination of the 2-D's 'Digitization' and 'Decarbonisation', as seen in figure 42, can help the non-aeronautical side of the business and enable an efficient use of the space at the Schiphol Airport.

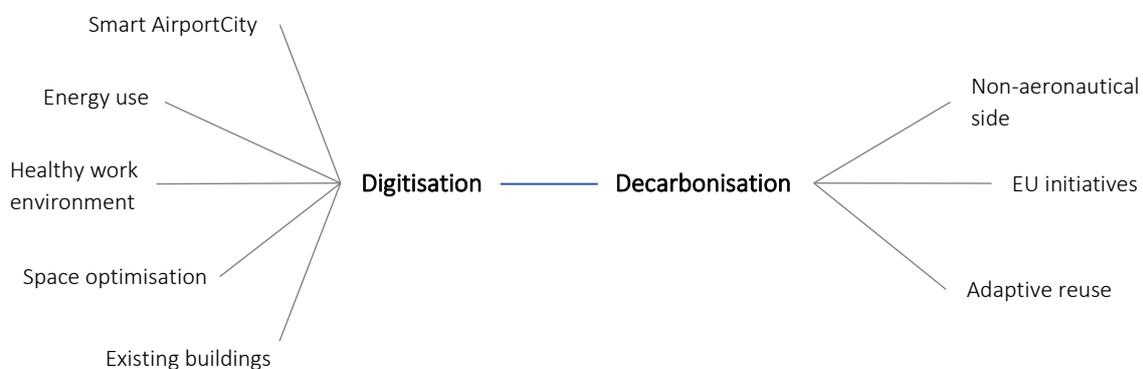


Figure 42. Strategic recommendation 4: The 2-D's strategy- Digitisation and Decarbonisation (own illustration)

6.5 Landlord - tenant interaction

Although the current tenants at the Schiphol Airport do not face any major challenges, there is a need for further interaction between the landlord and the tenant, as expressed during the interviews. As highlighted by one of the participants during the empirical research, Schiphol Real Estate currently has facility managers assigned to the buildings and are responsible for the smooth functioning of those spaces, but SRE does not have an explicit strategy focused on increasing the interaction with the tenants.

Increasing user involvement and deploying proactive interaction techniques has been mentioned by a number of authors to ensure user satisfaction and for increased usability of the built space. It is important for landlords to support the different users, each of whom have their own preferences, requirements and ambitions (Winch, 2009), with the built environment supporting the demands of the organisations and its uses occupying the space, as mentioned by Jensen (2011). The aim of this strategy should be to create a shared understanding, and thus improve the link between the office spaces provided and the business operations of the knowledge corporations, by engaging the tenants through a continuous dialogue and feedback process. There are a number of methods available that can help SRE to move in this direction.

Regular Post Occupancy Evaluations (POE's) has been advocated by a number of authors (Zimmerman & Martin, 2001), as a technique to understand the user satisfaction for the occupied space, once the tenant has moved in and used the space for a certain amount of time. The aim of this method is to understand the evolving demands of the tenants, and to make the changes accordingly for the future developments and make the necessary changes in the existing structures.

Other methods to increase the interaction between the different parties is to have regular meet ups with a representative from the corporations, or conducting regular surveys with the employees to understand their point of view and if any potential improvements can be made. Having this constant and robust exchange of ideas and communication between the two sides helps the landlord to mitigate some of the possible challenges in the future and also enables the tenants to feel more involved and more in control of the office space that they occupy and use on a long term basis, as seen in figure 43.

Although using this approach might be considered time consuming and requires more effort from Schiphol Real Estate, it can be seen as adding value in the long term, as it strengthens the relationship between Schiphol Real Estate and their tenants, and also helps for the better optimisation of the available space and creating quality office spaces in the future. It is also seen as a strategic decision by SRE, which characterises them as a landlord who are more involved with their tenants, as opposed to a traditional approach, and can attract more companies to locate at the AirportCity.

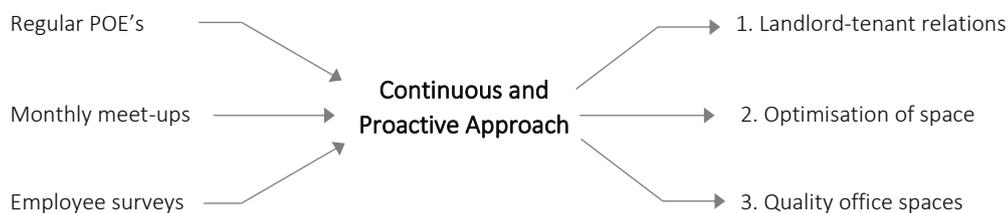


Figure 43. Strategic recommendation 5: Methods and results of increased landlord-tenant interaction (own illustration)

Summary

Table 8 shows each of the five proposed strategic recommendations, namely, 1: A move towards flexibility, 2: Creating knowledge hubs, 3: The SQUARE 1, 4: The 2-D's: digitization and decarbonisation, and 5: Landlord-tenant interaction, in relation to the main aspects of an Airport Office location, as illustrated in figure 19. Although, each of the recommendations does not respond to all the aspects, it is important to realise that a combination of these recommendations can be used to move towards an optimal utilisation of the real estate at Schiphol.

Themes	Strategic Recommendations				
	1	2	3	4	5
Location decision and motivation					
Hub function		Present	Present		
Strategic location		Present	Present	Present	
Multimodality	Present				
Accessibility	Present	Present			
Real Estate aspects					
Collaborative working		Present	Present		
Serviced offices	Present		Present		
Company size	Present		Present		
Shared facilities	Present	Present	Present	Present	Present
Flexibility					
Financial	Present		Present		
Spatial	Present	Present	Present	Present	
Spatial proximity					
Community vibe		Present	Present		Present
Smart Airport City					
Smart building tools			Present	Present	
Portfolio structure					
Core/ Peripheral	Present	Present	Present		
Functional use	Present				
Additional aspects					
Relational proximity					Present
Talent attraction		Present	Present		

Legend

Present	Not present
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No.	Strategy
1	Move towards flexibility
2	Create knowledge hubs
3	The SQUARE 1
4	Digitization & decarbonatization
5	Land- tenant interaction

Table 8. Matrix showing the strategic recommendations in relation to the main aspects of an Airport Office location (own illustration)

Looking at the location decision and motivation of the corporations, first, the move towards flexibility is related to the accessibility provided with the multimodality at Schiphol, in that the various modes of transport can help corporations and their employees to access the office location and provides some degree of flexibility. Second, with Schiphol creating knowledge hubs, companies can be encouraged to approach Schiphol with a more strategic outlook, wherein they look to interact with other fields such as education and research in the same location. Third, developing the new landmark facility called the SQUARE 1 also relates to the hub function at Schiphol and can serve as a strategic location especially for young businesses who are looking to interact with other similar type of companies. Fourth, continued efforts towards a digitization approach by Schiphol can also attract certain companies who are looking to implement the smart building tools within their workplace accommodation as a strategic decision.

Within the real estate aspects, first, the recommendation to provide further flexibility is associated with the size of the corporation, in that companies seeking flexibility usually look for partnerships with serviced office space providers and look for shared facilities, in order to be not bound by the long-term lease agreements. Second, creating knowledge hubs promotes a more collaborative way of working and helps companies utilise the shared services provided at Schiphol. Third, the SQAURE 1 caters to numerous real estate demands of the knowledge corporations and helps them work in a more collaborative environment by providing serviced offices and shared facilities. Fourth, by focusing on the 2-D strategy, Schiphol can further utilise the common facilities in a more efficient manner through the use of digital platforms and reduce the overall carbon footprint of the built environment. Finally, a continuous interaction between the landlord and tenant can help both sides utilise the available space more optimally.

Moving to the theme of flexibility, first, providing financial in terms of the lease contracts and the exit options, and spatial flexibility in terms of the amount of space being used by the companies, is seen as beneficial for both, the demand and the supply side. Second, creating knowledge hubs enables a certain degree of spatial flexibility, as companies have the spatial flexibility to use common working areas and services. Third, the SQUARE 1 acts as an incubation centre and is focused especially on providing spatial and financial flexibility that enable start-ups and young companies to establish more conveniently. Fourth, a move towards digital transformation also enables Schiphol to use the underutilised office spaces by providing spatially flexible options to the corporations who can use these spaces in a variety of ways, such as for temporary solutions.

Looking at the aspect of spatial proximity, facilities such as the knowledge hubs and the SQAURE 1, along with a continuous interaction between the landlord and the tenants, helps to develop and strengthen relationships among the different parties, while creating a community vibe among them. At the same time, the concept of the Smart Airport City falls in line with strategic recommendations 3 and 4, which consist of developing new buildings such as the SQUARE 1 which has an intensive use of smart tools, and the 2-D strategy that focuses on the digitization of the entire airport area.

Within the aspect of the portfolio structure, first, providing financial and spatial flexibility enables companies to set up either their core or peripheral offices at the airport, while supporting the different functional use according to the specific requirements of the companies. Strategic recommendations 2 and 3, which focus on creating the knowledge hubs and the SQUARE 1 facility, can also be related to this aspect, wherein Schiphol further focuses on providing serviced office spaces, especially for companies to set up their peripheral offices at the airport.

Finally, there are certain additional aspects, which can be related to the recommendations proposed to Schiphol; by locating in the knowledge hubs and in the SQUARE 1, companies have an added advantage to attract the potential talent by easy access to them, at the same time, by adopting a proactive approach towards landlord-tenant interaction can enable Schiphol to improve the relations with the companies and help in them in the long-term plans.

The next chapter focuses on the final conclusions of the graduation research, which answer the main research question and the sub-questions that focuses on the Real Estate developments at the Schiphol AirportCity. The aim of this report is to create a deeper understanding on the topics of Schiphol Airport as the Mainport of the Netherlands, and how it works as a knowledge precinct in the emergent knowledge economy.

VI. Conclusions

01 Answer to the research sub-questions

Q1: "What is the importance of non-aeronautical businesses for Schiphol as a Mainport?"

With the Mainports promoting the national economic growth, the Dutch government developed efficient infrastructure to the hinterland from the Schiphol Airport and the Rotterdam port for them to function as gateways into the country and to improve the position of the country on the international market (Schaafsma, 2010). As seen in the literature review (Chapter 2), both the ports developed rapidly over the years, the aim of the Mainport strategy shifted from 'spreading' to 'strengthening' the Mainports and to move towards more quality developments (Kuipers & Manshanden, 2010).

Over the years, the Mainports evolved from being transport nodes, to generators of economic activities, and had five well-defined functions, namely, goods node, passenger node, cluster magnet, business generator and an international reputation and image (Priemus, 2001), as seen in figure 5 and figure 44. Focusing on the economic impact of the Schiphol Airport, it is important to see that that these effects can be divided into four main categories, namely, direct, indirect, induced, and catalytic, that contributed significantly to the national GDP (Bleumink et al. 2006; Intervistas, 2015). As the role of Schiphol changed from being an engine to a facilitator in the past few years, Bleumink et al. (2006) have defined the economic sectors the catalytic economic effect contributes towards: world trade, tourism, global labour productivity and the creative industry.

Over the past few years, authors have emphasized the importance of non-aeronautical activities at the airports which are characterised as hubs of flow (Freestone, 2009) by a continuous movement of people and cargo through it. Numerous airports around Europe, such as Zurich, Copenhagen, Munich and Oslo, generate close to 50% of their profits from the non-aeronautical side of the business. This includes various sectors such as retail, industrial parks, business parks, research and education institutes and distribution centres, as highlighted in figures 8 and figure 44. Airport authorities perceive these landside real estate development as more than just a supplementary source of income, rather they see the advantage in diversifying, to maintain a steady fiscal flow in the case of unforeseen circumstances in the aviation industry (Hirsh & Van der Horst, 2018). Along the same lines, Kasarda (2004) has called the airports as the centre of the new emerging cities, driven by the new knowledge economy, that have developed into the modern business locations and has coined the term Airport City, shown in figure 10. Also, Conventz and Thierstein (2015b) highlight that apart from the locational advantages of the airport, characterised by the multimodal forms of transport available, the real estate facilities need to be focused on for the airports to continue to be attractive business locations.

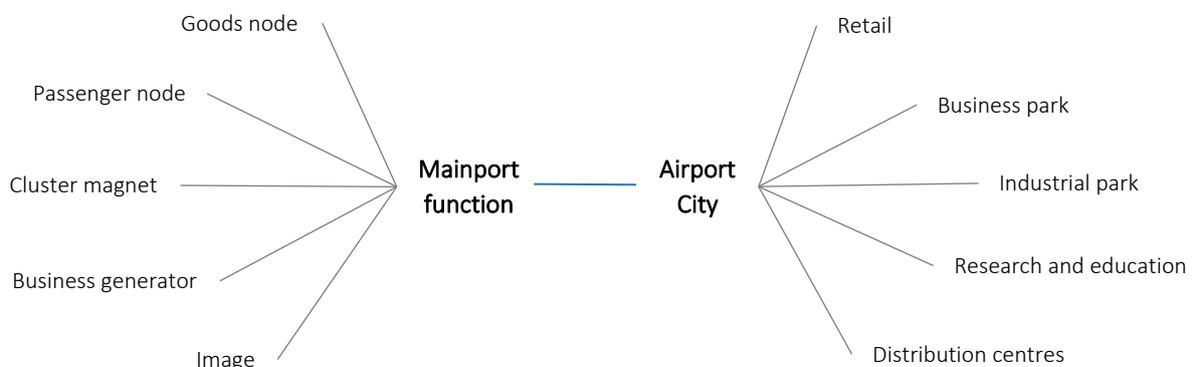


Figure 44. The main aspects of the Mainport and the Airport City, as highlighted in the literature review (own illustration)

Q2: “How does the knowledge based economy influence the commercial real estate developments around airports?”

With the developments in the economic, political and technological sector, the business world has seen a move from the natural-based economy to a knowledge intensive network economy, with more importance given to the creation and sharing of knowledge, which is regarded as the fourth resource of production (Conventz & Thierstein, 2015a). At the same time, the increasing trend towards globalisation has connected corporations and their employees from different parts around the world through improved modes of transportation and ICT developments, which has promoted further sharing of knowledge (Archibugi & Lundvall, 2002). These two aspects have given rise to the knowledge economy, in that the knowledge is seen as the key driver for research, innovation and development (Howells, 2002). Along the same lines, Thierstein et al. (2006), categorise the knowledge economy into three main sectors, Advanced Producer Services, High Tech Industries and research facilities and universities, as shown in the literature review (Chapter 2).

Knowledge based activities tend to locate in close proximity to one another in vibrant and well-connected urban locations, known as ‘knowledge precincts’ that promotes the generation and exchange of knowledge, while creating local knowledge spill-overs (Florida, 2015). These knowledge precincts are built on the foundation of two primary functions, firstly, to encourage the sharing of knowledge between different corporations and to promote the growth of SME’s, and secondly, to act as a catalyst and foster the socio-economic growth of a region (Yigitcanlar, 2010). According to Yigitcanlar et al. (2008), knowledge precincts are characterised by five aspects, living and working, centrality, branding, learning and playing and connectivity, as seen in figure 12 and figure 45. Numerous authors advocate that the airport location functions as a knowledge precinct, with its multimodal transport hub function that connects a number of national and international business locations (Button et al., 1999; Dvir & Pasher, 2004).

In the context of an Airport City, which acts as a knowledge precinct, two main external forces interact with each other which leads to the process of knowledge generation, firstly at the meso level are the agglomeration economies, in which numerous knowledge intensive corporations locate around the airport, and secondly, at the macro level are the global network economies, which enables these corporations to benefit from the national and international accessibility provided at the airport (Conventz & Thierstein, 2015a; Lüthi et al., 2012), as highlighted in figure 13 and figure 45. Thus, an interplay of these two forces influences the strategies and demands of corporations locating at the airport, and makes it a suitable business location.

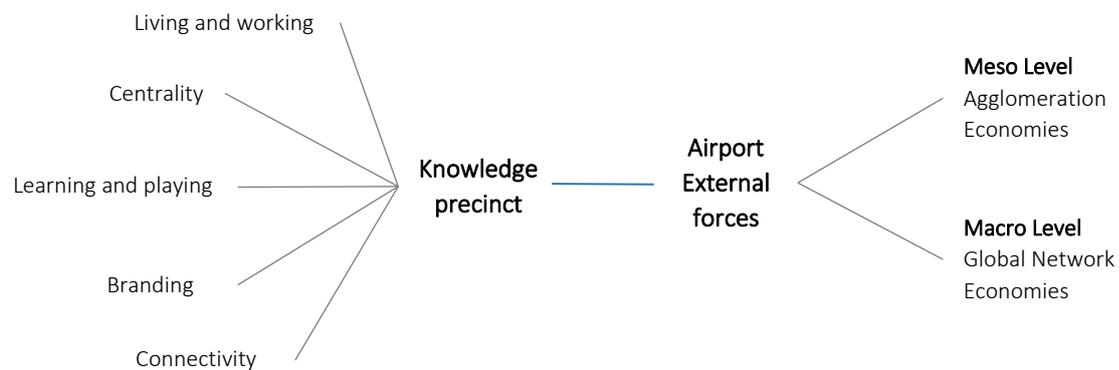


Figure 45. The main aspects of the Knowledge precinct and the external forces interacting at the airport, as highlighted in the literature review (own illustration)

Q3: “How can the commercial real estate at Schiphol facilitate the knowledge corporations?”

With the aim of gaining a deeper insight into the real estate developments at the Schiphol Airport, this section elaborates on the combined findings from the demand, supply and expert sides, in relation to the office spaces. As shown in figure 35 and figure 46, these findings are based on the themes and sub-themes identified previously in the literature review.

The existing infrastructure facilities at Schiphol, which provide national and international accessibility to other business locations are one of the main reasons corporations locate there, along with this, the connectivity to different parts of the country helps the corporations draw on an enormous employment pool. The location decision and motivation of the companies also depends on the size of the corporation and the function that this particular office space serves. For the larger companies, Schiphol serves as a strategic location for numerous reasons described in the previous sections, and at the same time for the smaller corporations, additional services and facilities play an important role.

The real estate demands of the companies also depend on several factors other than the size of the company. There is a clearly high demand for serviced office spaces, wherein the office operators provide a number of amenities, such as meeting rooms and hospitality services. These demands also depends on the culture and the maturity levels of the companies, if they prefer to locate in multi-tenant or single-tenant buildings, and how client-facing the companies are. These factors, along with the lease prices and the quality of the office space offered also affect the decision of the company to locate in the Schiphol CBD or Schiphol East.

The corporations at the Schiphol AirportCity have an equal mix of core and peripheral office spaces at the airport, depending on the requirements of the companies. The companies use various portfolio options for a variety of reasons, such as cost-saving measures, increased convenience for the employees and time saving measures. It is interesting to see that certain offices at Schiphol do not follow the objectively defined functions of a core or peripheral office space, rather they serves different functions for different employees, depending on the local or international market they serve.

Flexibility is seen as one of the core aspects to emerge from the empirical research, wherein providing financially and spatially flexible options shows immense potential to satisfy the needs of the corporations and optimise the space available at the airport. Certain challenges faced by the corporations have also been identified through the empirical research and catering to these challenges shows areas of potential that Schiphol can further explore. At the same time, after analysing the findings from the three perspectives, demand, supply and expert, there were various opportunities that became evident that can help Schiphol cater to the knowledge corporations by providing the optimal real estate facilities and deploying initiatives that can help to foster its growth.

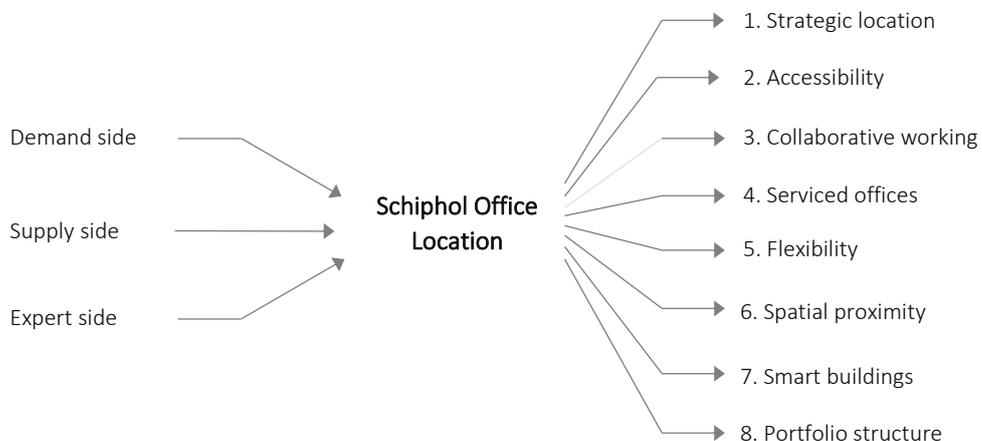


Figure 46. The main aspects at the Schiphol Office Location, based on the findings from the demand, supply and expert sides, as highlighted in the Synthesis chapter (own illustration)

02 Answer to the main research question

“How can the commercial office real estate portfolio at Schiphol Amsterdam Airport help to foster its strategic growth as a Mainport, by facilitating the corporations in the knowledge economy?”

The aim of the main research question is to produce a set of strategic recommendations for the office space at the Schiphol Airport to be utilised in an optimal manner, and at the same time, to understand the demands of the knowledge intensive corporations that locate there and to ensure that the current facilities align with these demands. The main research question is answered through the previously described sub-questions and also through the strategic recommendations, as shown in figure 47.

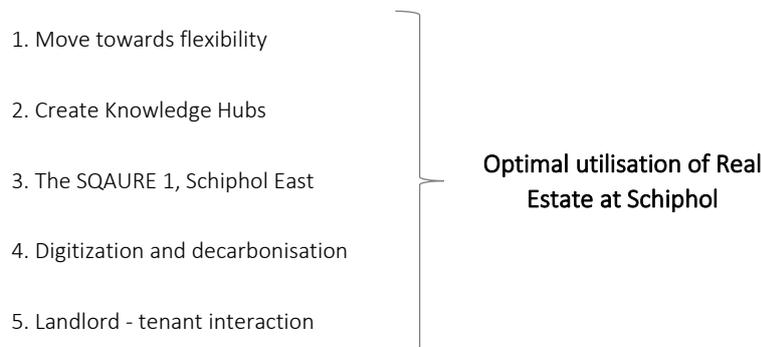


Figure 47. The strategic recommendations for optimal utilisation of real estate at Schiphol (own illustration)

- Focusing on providing financial flexibility in terms of the lease contracts and exit options and spatial flexibility in terms of the amount of space offered, can help Schiphol cater to the demands of numerous corporations locating at Schiphol. Providing these options not only attracts more corporations to the Airport City, but also increases the value per sqm of the existing buildings. With the difference in the occupancy rates at Schiphol CBD and Schiphol East, varying approaches for the two areas should also be followed. Finally, these flexible options can help a number of knowledge intensive corporations, such as first-time movers to the Dutch market, companies facing growth uncertainty, and those looking for expansion or buffer space.
- Next, Schiphol can focus on creating knowledge hubs to bring research, education and business together, wherein the future constructions at the AirportCity are aimed towards developing buildings and an area that bring the three fields together and act as buffer areas between them. Promoting this strategy initiates innovation and contributes back to the knowledge economy, wherein all three parties mutually benefit from one another under one roof.

- Schiphol can develop a new facility, THE SQUARE 1 in Schiphol East, which can create a new identity for the area. This new multi-tenant building can act like an anchor building for the area and be focused on young companies and start-ups, and thus can act as an incubation centre for businesses by providing the appropriate real estate facilities, such as numerous shared services and facilities, flexible meeting and working area, training facilities for employees, etc.
- A focus on digitization and decarbonisation helps the non-aeronautical business at the airport and ensure the optimal utilisation of the space. Schiphol is already working in this direction and has deployed a number of initiatives to become the first Smart Airport City in the world.
- Along with these strategies, it is also important to maintain and further improve the relationship between the landlord and the tenant by taking a continuous and proactive approach towards this. With a number of management strategies available, such as POE's, monthly meetings and employees surveys, Schiphol is able to improve the current relations, optimise the space and offer quality spaces to more knowledge corporations at the airport, and thus contributing back to the Mainport strategy of the Netherlands.

VII. Discussion

This chapter focuses on aspects such as the contribution of this research towards the existing literature on the topic, the internal and external validity of this research and its scope of transferability and the possible scope and areas for future research that are related to this topic.

01 Contribution to existing literature

The findings from this research contribute to the exiting literature and bring together a number of topics- the Schiphol Airport as the Mainport strategy of the Netherlands, the emergent knowledge economy and the real estate and locational demands of corporations at the Airport City. With an increasing number of authors producing research focused around the airports and their influence on the spatial developments, this research tries to add to the existing literature and fill a gap by showing the importance of bringing the three aspects together. With the airports being regarded as the fifth wave of human settlement around the transport hubs, after seaport, rivers, railways and highways (Kasarda, 2004), this research focused on the locational and real estate requirements of the corporations locating at the Airport City.

The existing literature focuses on the Mainport strategy and the developments of knowledge precincts separately, this research intends to add a third dimension to the research focused on Airport Cities, with Schiphol as the primary focal point of the study. Numerous authors have called for an in-depth understanding into the interaction and contribution of knowledge corporations, from the point of real estate, at the airports (Conventz and Thierstein, 2015a; Yigitcanlar, 2008).

As mentioned by Conventz & Thierstein (2015a), Van Wijk et al. (2011), Lüthi et al. (2012), and seen in the empirical research, accessibility, to their clients and employees, has been one of the primary reasons for corporations to locate at the airport. This research has shown a change in the way of working that corporations have experienced at the airport, towards a more collaborative style, and this has a direct influence on the type of real estate that they demand, i.e., more meeting rooms, collaborative and flexible workspaces and employee training centres. Another interesting finding that aligns with the views of Lüthi et al. (2012) is that that corporations have an increased relational proximity with their customers and also with other branches of the company, which is influenced by the ease of travel to other business locations. Through this research, flexibility emerged as one of the key aspects that influences the way corporations work around the airport location, which has not been mentioned in the literature studied for this thesis. For Schiphol Real Estate, as the landlord, flexibility shows scope for the future, as it enables them to capture the flow of business personnel through the airport and provide suitable real estate facilities.

Next, this research also focuses on the portfolio structure followed by the corporations at the airport, which has not been seen in the previous literature related to Airport Cities. Although Schiphol has an equal mix of core and peripheral offices for corporations, a new finding shows that these offices do not follow an objective use and have a different functional use for different employees. Spatial proximity has been regarded as one of the key factors for the development of a knowledge precinct in literature for knowledge creation and spill overs, as mentioned by Desrochers (2011), Lüthi et al. (2012) and Howells (2002). As seen through this research, the corporations at the airport, do not necessarily interact with other corporations around them, instead being at the airport is related to a sense of belonging to a community that they feel. Another interesting finding is that certain corporations at the airport do not regard spatial proximity as being physically located close to one another; due to the multi-modal travel options available at the airport, spatial proximity rather corresponds to the ease of travel to other business locations from a transport hub.

For this research, all the findings corresponding to the locational and real estate aspects of the office at the airport location are also related to the two main concepts that formed the starting point of this research 'Schiphol as the Mainport' and 'Knowledge precincts' as seen in figure 31. Finally, the proposed recommendations and strategies for Schiphol Real Estate are based on the findings from the research and it is also important to mention that although these are primarily formulated around the Schiphol Airport, these can also be looked into and implemented by other developing Airport Cities that can cater to the knowledge economy.

02 Internal validity

The internal validity of a research is based on the structure of the study and ensures how well the research was conducted. It focuses on the procedures followed throughout, how diligently they have been followed and whether the research justifies the cause and effect relationship between the different variables in the study (Bryman, 2016). The internal validity around this research deals with three main aspects, namely, assumptions, selection procedure and triangulation.

Firstly, all the assumptions in this research are based on the literature study conducted by the researcher, which set the context for the study. Numerous authors were selected to conduct the literature review which formed the knowledge base for this research, and at the same time the findings from these authors were cross-checked to ensure their validity. But, it is also important to mention that the premise of this research is based on the interpretations of the researcher and could have been varied if certain different literature studies were included. The literature review thus formed the main foundation for the themes identified for this research, based on which the empirical part of the study was conducted.

Secondly, as the research is primarily based on the commercial real estate at the Schiphol Airport, the corresponding case studies and interviewees were selected for the empirical part of the study. To ensure an unbiased selection, the corporations selected were based on the case study selection criteria which was previously defined. To get a deeper insight, a cumulative sample set was selected which included companies of different sizes and company cultures, and which were located in different parts of the Airport City, to get an overview of the corporations locating there.

Finally, the empirical research findings were based on a triangulation technique, in which different parties were tested on the same themes and sub-themes to get a holistic view of the subject. Four different cases were selected which represented the demand side, multiple interviews with two office suppliers, and three interviews with experts to get their unbiased opinions were conducted to construct the internal validity of this research. With the nature of the qualitative studies, as the demand and supply side tend to be self-biased, the interviews with the experts helped to corroborate the findings from the two sides and showed a neutral standpoint on the subject.

It is also important to point out that during the process of this research, we faced a global pandemic, COVID-19, which did put forward certain obstacles, but it was ensured that the results were not influenced by this unexpected phenomenon. A change in global conditions does tend to impact the mindset of the interviewees, but it was important that the researcher did not get influenced by those and continued with the previously planned research procedure.

03 External validity and transferability

External validity relates to the extent to which the findings from this research can be generalised and be applied in other contexts. Transferability is related to external validity, in that it measures whether the results from this study can be transferred to other settings with similar circumstances (Bryman, 2016).

As the concept of Airport Cities is growing around the world, certain characteristics from this study can be replicated and transferred to other locations. Also, the scope of this research covers the knowledge corporations at the Schiphol Airport, and the findings from the cases can be applied to other companies located or planning to locate at the Airport City. The theoretical framework developed at the end of the research can be applied across

a variety of companies, and also with certain modifications applied to other Airport Cities, within their existing conditions.

At the same time, this research was constructed primarily around the Schiphol Airport City, hence emphasis should be laid on certain aspects to check for its external validity. It is important to realise that the steps and efforts put in place by the airport authorities at Schiphol are substantial and have not been replicated at other Airport Cities to the same extent (Hirsh, personal communication, April 28, 2020). This means that Schiphol can be seen as a pioneer and has reached a certain level of maturity in relation to the concept of an Airport City. Along with this, there are certain other factors, such as the size of the country, the availability of land, and financial aspects, among other factors, that are specific to Schiphol and make the research context-bound to a certain extent.

Most airports around Europe face similar situations and might be able to replicate certain findings from this research, with increasing focus on offices at the airports. In other parts of the world, a number of factors might vary, such as the size of the country, the development stage of the country, national and local policies, the work culture, among other things, which alter the boundaries of this research, wherein further studies need to be adjusted according to the local conditions of the specific regions.

04 Scope for further research

The aim of this research was to gain a deeper understanding of the interplay between the Mainport function, the concept of knowledge precincts and the airport as an office location in today's economy. Firstly, taking this research to the next step can be focused on relating these findings to the aviation demands of the corporations in a quantitative manner and how this influences the real estate at the airport. Also, exploring sectors other than the knowledge economy, based on the theoretical framework developed at the end of this research, can help gain a wider perspective on the Airport City and how the spatial development around it will be influenced in the future. Another aspect to be explored is by increasing the number of case studies and interviews, to verify the findings and the theoretical framework developed in this research. The future research can also be focused on the application of the strategic recommendations proposed in this research, and to prepare a step by step implementation plan for it.

Secondly, further research can be taken to different countries, to see how the theoretical framework is affected individually in each of them. Creating a cross-country analysis of the framework can help gain an international perspective on the topic. With the concept of the Airport City gaining momentum in a number of countries, the learnings from the Schiphol Airport can help create a guideline for these developing Airport Cities in order to utilise the space optimally and to contribute to the regional economy of the area.

Finally, looking ahead, it is also important for airport authorities to increase the competitive advantages they offer at the airport as a business location. For this to happen, it is important that the airport is integrated into the urban fabric of the region that it serves and that they work hand in hand to increase the overall economic growth of the area. This aspect can be looked into by exploring the social aspects, such as the policies that are deployed in the area by the local and the national governments and their relationship with the airport authorities, and how these can be further developed or modified to ensure the overall growth of the region.

VIII. Reflection

This section contains the reflections on the process and conclusions of this graduation thesis, to give an idea on how the thesis progressed from the point of view of the researcher. This section is divided into three sub-parts, namely, research topic, research relevance (scientific and social) and a reflection on the research process, in terms of the content and a personal experience of the researcher.

01 Research topic

This research forms a part of track Management in the Built Environment (MBE), and the graduation lab Real Estate Management (REM). With the aim of the research focused on gaining a deeper understanding into the landside developments at the airport and how the office spaces at the Schiphol can be utilised in an optimal manner to contribute back to the national Mainport strategy, this research forms a part of the MBE track. The literature review, that focused on developing a scientific background for this research, helps to gain an insight into the academic developments on this topic, and the knowledge gap that this research aims to fill.

The goal of the graduation lab Real Estate Management is to understand and close the gap between the demand and supply sides, by providing adequate quality space for the utilisation, both on a long term and a short term basis, and to ultimately contribute to the business needs of the organisation. This aligns with the scope of this graduation thesis, wherein the research then focus on identifying the relevant stakeholders from the demand and the supply sides and analysing their organisational and spatial strategies and demands which influence the spatial developments within the Airport City. Based on the findings from the research, certain strategic recommendations are proposed which help to cater to the current and future demands of the knowledge corporations at the airport, while also contributing towards the overall development of the airport organisation.

02 Research relevance

2.1 Social relevance

This research on the concept of Airport Cities and landside developments, holds importance for a number of parties and can be seen through numerous social perspectives. The problem statement for this research was identified on a societal issue, wherein, the limit on the number of flights and the rising airport charges pose a serious threat to the Schiphol Airport as an international hub. A focus on the landside developments contributes to the overall business of the airport, and at the same time, by addressing the emergent knowledge economy, this research also looks to contribute to the Mainport strategy of the Netherlands by focusing on the knowledge intensive corporations.

Although the concept of an Airport City is quite region-driven where a number of aspects depend on the local factors, this research proposes a theoretical framework and strategic recommendations, that can be adjusted to the local context and be useful for other developing regions and their Airport Cities.

Also, as Schiphol is seen as a thriving business location and since the research involved the corporations that are actually located at the Schiphol Airport, while focusing on their demands and strategies, the research is highly pertinent to the other companies located there or are looking to (re)locate at the airport.

2.2 Scientific relevance

Over the past two decades, numerous authors have produced literature regarding the development of Airport Cities and how the spatial developments occur around them. The role of the airport has transformed over the years from being a transportation infrastructure facility to a generator and promoter of economic growth that influences the real estate developments around it. This research aims to build up on and add to the existing literature, in the Dutch context, by combining the two concepts of Schiphol as a Mainport and its economic importance for the region, and the knowledge precincts that are focused on the creation and spill over of knowledge among corporations.

As Conventz and Thierstein (2015a) and Yigitcanlar et al., (2008) call for a deeper research in the fields of urban planning and real estate developments for the airport location, this research tries to fill that gap in the existing literature by adding a third perspective of the locational and real estate requirements for an office at the airport. As explained previously, this research also paves a way that encourages further research in this field which can be transferred to other Airport City locations. Conducting a cross-country analysis will lead to interesting findings, based on a variety of contextual settings and help to develop an international perspective on the topic.

03 Research process

3.1 Content

This section provides a feedback and reflection on the research methods chosen and their results for this graduation thesis. A qualitative research approach was chosen, with the aim of understanding the demands and strategies of the various stakeholders involved at an Airport City. Using the existing literature on the topics of the Mainport and the knowledge precincts helped to develop an ideal knowledge base for the rest of this thesis. Developing a theoretical framework at the end of the literature review was considered a crucial step to give a combined overview of the two topics and helped to structure the next stages of the research.

Next, for the empirical part of the research, the themes and sub-themes identified from the previous stages, set up the foundation and were considered the main guidelines for the rest of the research. Initially, for the empirical part, the researcher had planned to conduct only case studies that would represent the demand side at the Airport City. But, as the research progressed, the researcher realised the importance of adding the perspective of the supply side to get a more holistic view of the subject. Finally, a third perspective was added to the empirical findings which represented the expert opinions, through the triangulation technique, which helped to corroborate the findings from the previous interviews and also have an unbiased opinion towards the topic. Using a semi-structured format for the interviews helped the researcher guide the interviews as per the answers provided by the participants. Having a flexible approach for these interviews also helped to gain a deeper insight into the point of view of the participants. The findings from the empirical part were then added to the previously developed theoretical framework, which helped gain a comprehensive perspective on the topic.

As this research was purely qualitative, having a quantitative approach combined with it could have helped to further strengthen the findings from the study, but nevertheless, having the three perspectives in the empirical part of the research, backed up by the literature review helped to build a solid foundation for this research. It is also important to mention that during this research, an unforeseen global pandemic had occurred, which did create certain obstacles for the research. Most of the interviews and case studies had already been conducted, and the others were conducted through online platforms and telephonic conversations due to the travel bans imposed throughout the world.

3.2 Personal experience

This graduation thesis started in August 2019, with the plan of being completed in June 2020. The starting phase of this research was an intensive period in trying to understand the topic for the thesis. The development of real estate around a transportation hub, especially at an airport was always an interesting idea for me, as Schiphol forms one of the most important airports in the global aviation market. The concept of non-aeronautical activities has been looked into by researchers in the past two decades, and lacks a comprehensive scientific literature, especially from a real estate perspective. Since there is not a lot of literature out there specifically focused on this subject, it was a bit challenging to narrow down the scope of the research and to realise what I wanted to achieve from the thesis.

The open format of the graduation topic is good in the sense that it gives the freedom to choose our own topic of interest, but at the same time, it was challenging for me to try and narrow down the scope. Another challenge I faced was that since the research is done in a context specific to the Netherlands, a large part of the literature had to be translated from Dutch to English, Dutch not being my native language. With two separate topics 'the Mainport strategy' and the 'knowledge precincts' that formed the foundation of this research, a lot of existing literature had to be analysed to establish the relationship and co-dependence between the two concepts.

Next, was the empirical part of the research that I appreciated the most, while conducting interviews with a number of people at their offices at the Schiphol Airport, where I had the chance to verify my findings from literature and add new data to it. This part also required a lot of effort, especially to get in touch with the people for the interviews, sending over 50 requests for the interviews through emails and LinkedIn requests. I was also constantly in touch with some of the personnel from Schiphol Real Estate, who were more than willing to help with the information I needed and also introduced me to some of the other interviewees. The numerous visits to the Schiphol AirportCity gave me an opportunity to actually have a first-hand experience of the setting which was an important step in the research process. The online interviews with the experts were some of the most intriguing conversations, to see the topic from their point of view and understand their take on the research findings.

Finally, I would also like to address that there were certain unexpected developments during the final stages of the research, with the world facing a global pandemic- COVID-19. With this global phenomenon, there is a general concern about the future of the real estate industry, which would also be affected, according certain reports being published that mention the possible changes in the future of the real estate and business locations (Aalders & Raspe, 2020; CBRE, 2020). Although it is difficult to predict the future on such a short term basis, and as mentioned by one of the experts, the real estate market would possibly drop as the companies begin to realise their changing spatial demands, but an airport location has other added advantages that make it more resilient than other business locations, and thus give it a stronger foothold in the market.

IX. References

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X. Appendices

List of Appendices

Appendix A	Form of consent	149
Appendix B	Interview Protocol Type 1	150
Appendix C	Interview Protocol Type 2	153
Appendix D	Interview Protocol Type 3	156
Appendix E	Details of interviewees	159
Appendix F	Building numbers at Schiphol	160
Appendix G	List of serviced office spaces at Schiphol	162
Appendix H	List of knowledge corporations at Schiphol	163

Appendix A: Form of consent

Please tick the appropriate boxes

Yes No

Taking part in the study

I have read and understood the study information dated (dd.mm.2020), or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves answering questions that will be audio-recorded, with the sole purpose of transcribing the interview, after which, the recordings will be deleted.

Use of the information in the study

I understand that the information I provide will be used for the research called 'Real Estate at Schiphol Amsterdam Airport. Creating a functional program for Schiphol based on the knowledge economy.' Conducted by a master student Shrey Yadav. The information can be presented in a form of a written report and presentations.

I understand that personal information collected about me that can identify me (e.g. contact information or where I live), will not be shared beyond the study team.

I agree that my information, such as real name, can be quoted in research outputs.

I agree to joint copyright of any written data provided to Shrey Yadav.

Future use and reuse of information by others

I give permission for the research outputs to be shared on the TU Delft educational repository, which will be formulated as a result of interviews anonymously transcribed, and to be used for future research purposes.

Signatures

Name of participant

Signature

Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understand to what they are freely consenting.

Shrey Yadav

Name of researcher

Signature

Date

Appendix B: Interview Protocol Type 1

Introduction

I would like to thank you for agreeing to participate in this interview. The interview is a part of my Masters graduation research in the department of 'Management in the Built Environment' at the Faculty of Architecture and the Built Environment at the TU Delft. The graduation thesis focuses on the real estate developments in the Schiphol Airport area. Through this research, the aim is to understand the role that the knowledge-intensive corporations play in the real estate developments around the airport and their spatial demands and strategies. Thus, by understanding the point of view of these corporations, a strategic plan will be formulated for the optimal utilisation of real estate facilities at the Schiphol Airport.

The outcome of this interview gives the researcher an insight into the working of corporations settled at the airport and the factors that influenced this location decision. The interview will last for approximately 1 hour, and I would like to remind you that this information would only be used for academic purposes. Accordingly, I would like to ask for your consent to record this interview, with the sole purpose of transcribing it, after this, the recordings will be deleted. Your answers in this interview will remain confidential.

Please keep in mind that you can refuse to answer any of the questions and you can withdraw from the study at any time. If you agree with this, I would like to thank you again for participating in this interview and kindly ask you to sign the Informed Consent Form.

0. General

- Could you briefly describe your position at the corporation and the nature of your work?

1. Nature of work at the corporation

- Can you please describe the nature of the work at your office located at Schiphol? Does this office work as a headquarter or as a branch office for the company?

According to theory, the knowledge-intensive corporations can be broadly classified into Advanced Producer Services (APS), wherein corporations provide services based on their knowledge and expertise or High Tech Industries, wherein corporations focus on R&D facilities.

- Would you say that the type of work at the corporation is more related to a providing services to their customers or is it more of research and development work?

2. Location decision and motivation for Schiphol

- For how long has the corporations been located at Schiphol? Could you describe some of the main factors that influenced the location of the company at Schiphol?

Based on the experience of the corporation locating at Schiphol,

- Could you mention some of the benefits for the company, in locating at Schiphol?
- What are some of the challenges that the company has faced, internally or externally, in locating here?

3. Accessibility requirements for the company to locate at Schiphol

As we know, Schiphol is one of the best connected airports in Europe, especially due to its location exactly between the Atlantic world and the Eurasian continent.

- How important would you say is the connectivity offered by the Schiphol Airport for the company?
- Does the reputation of Schiphol as an internationally connected airport also play a role in choosing the location of the office here (as compared to other locations in the Netherlands or even other airports)?

4. Face-to-face interaction and relational proximity

As mentioned by a number of authors, even with the technical advancements in today's date, the exchange of knowledge within the same company requires the employees to physically meet each other and have face-to-face interaction on certain occasions. Along the same lines,

- How is the communication managed with the partners and clients located in other parts of the world? Can you give some examples?
- How important do you consider face-to-face interaction for exchange of knowledge at the company, both, within the company and with external parties? Are there any specific spatial demands with respect to this aspect?

5. Spatial proximity to other firms

It has been widely acknowledged in theory and practice, that knowledge corporations prefer to locate in clusters with other companies to mutually benefit from one another.

- In the case of your company, do you have interactions with other corporations located at Schiphol?
- Could you please explain if other knowledge corporations located at Schiphol benefit the company in any way?
- Is there a demand to promote interaction with other corporations from Schiphol, and if yes, has your corporation deployed any strategies to enhance this interaction?

6. Core-periphery portfolio

According to literature, the type of office space occupied by a corporation plays an important role in the knowledge generation process. Corporations are now seeking property related solutions for their company, from headquarter buildings (for the permanent and stable parts of the business) to supporting/ satellite office spaces which might be occupied on a temporary basis (for the secondary part of the business). This has been classified as core and peripheral portfolio buildings.

- Could you please describe how does the company use its office space at the Schiphol Airport? To which part of the portfolio does this particular office space belong?
- Do you think the airport location is more suitable for either one of these portfolio options for the knowledge corporations? Why would you say so?

7. Other push and pull factors

- Do the current real estate facilities offered at Schiphol suffice the corporation? (in terms of the type of office space, the lease agreements, etc.)?
- Could you mention any additional real estate facilities or improvements from the current services that you would like Schiphol to offer, and that would help the company at the airport location?

- Can you state three strengths for the company to locate at the Schiphol Airport?
- And can you state three weaknesses or challenges (if any) faced by the corporation in locating at the Schiphol Airport?

8. Long term plans with respect to Schiphol as a business location

With the concept of the Airport city gaining further popularity and with more corporations locating at the airport

- Are there any future intentions to expand or shrink the company at the current location?
- Do you see the airport becoming an increasingly popular business location for other corporations within the IT sector in the near future?

Are there any other points that you would like to mention that would contribute towards the research?

I would like to thank you for taking out the time and participating in this research. Also, if you would be interested, I would be happy to share the results of my research with you, once it is completed.

Appendix C: Interview Protocol Type 2

Introduction

I would like to thank you for agreeing to participate in this interview. The interview is a part of my Masters graduation research in the department of 'Management in the Built Environment' at the TU Delft. The graduation thesis focuses on the real estate developments in the Schiphol Airport area. Through this research, the aim is to understand the role that the knowledge-intensive corporations play in the real estate developments around the airport and their spatial demands and strategies.

The outcome of this interview gives the researcher an insight into the rationale behind companies choosing to locate at the Schiphol Airport, at the same time, to get an expert perspective on some of the findings from the previously held interviews. The interview will last for approximately 45 minutes, and I would like to remind you that this information would only be used for academic purposes. Accordingly, I would like to ask for your consent to record this interview, with the sole purpose of transcribing it, after this, the recordings will be deleted. Your answers in this interview will remain confidential.

Please keep in mind that you can refuse to answer any of the questions and you can withdraw from the study at any time. If you agree with this, I would like to thank you again for participating in this interview and kindly ask you to sign the Informed Consent Form.

PAST

Schiphol Mainport and the knowledge economy

A number of authors have said that over the past two decades, the role of the Mainport Schiphol has evolved from being an engine of economic growth to a facilitator for the Rijnland area, while contributing to industries such as trade, tourism, labour productivity and the creative industry.

- How relevant is the Mainport strategy and what impact does it have for the strategic decision making at Schiphol Real Estate?

In today's emergent knowledge economy,

- Does Schiphol Real Estate especially look to attract corporations from the knowledge economy? If yes, then how? And if no, then do you think increasing focus on the knowledge economy can ultimately contribute to the Mainport strategy of the Netherlands?

Business model of SRE

- Could you briefly explain the business model followed by Schiphol Real Estate?
- Who are some of the biggest tenants for Schiphol Real Estate?

Certain experts say that for Schiphol to continue as a successful business location, it is equally dependent on the developments in the aviation side of the business, and the accessibility provided by the airport. On the other hand, certain economists argue that in fact it is the local economy that contributes to its growth.

- What is your stand point on this topic and how do you take this into consideration?

Schiphol as a location

With increasing globalisation, we see a large number of European Headquarters and Distributions Centres located in the Schiphol region.

- Within the Schiphol area, do you see an increasingly high demand for any of the specific areas? (Schiphol CBD). Are there any specific strategies/ measures being taken to increase the demand for the rest of the areas as well?

Type of office space provided

We know that for most of the corporations that decide to locate at Schiphol, the accessibility provided by the airport, in terms of road, rail and air, is one of the major factors that influence this decision. Along with the accessibility factor, if we look at the real estate provided by Schiphol Real Estate,

- Do you see a changing demand in terms of the type of office space (such as open floor plans or highly agile working spaces) that the corporations demand to locate here?
- Do you see an increasing focus towards serviced offices or do corporations prefer to have the freedom to design and manage their own offices?

PRESENT

Currently, I have interviewed some of the companies located at Schiphol, and this includes different types of corporations, from 400 employees to about 10 employees at the office. Based on the responses I got from some of these interviews, I would like to understand your point of view on some of these topics.

Spatial flexibility

With an extremely high demand for corporations to locate closer to the Schiphol CBD, and at the same time certain companies mentioning that with the airport location comes certain restrictions in terms of security and height restrictions.

- Do you see this as a challenge for Schiphol Real Estate, and are there any plans or steps taken to optimize the use of space in the CBD?

(Note: Also, I read that a few initiatives such as 'Spacemaker' and 'Parkflex' have also been undertaken by Schiphol.)

Lease contracts- flexibility

As seen in theory and mentioned by few of the interviewees, providing financial flexibility can be seen as a way of optimising the space offered, while at the same time it can be seen as an attractive offer for certain types of companies, based on the industry they work in.

- As a provider of office spaces, does Schiphol Real Estate work towards providing financial flexibility to its tenants, and how?
- Do you think that the CBD and other areas such as Schiphol East require a different approach in terms of the type of lease contracts and their duration?

Smart buildings

With the increasing technological advancements, and the concepts of smart buildings gaining momentum, the Outlook office building is a really good example of the concept. Also, I read that Schiphol plans to incorporate a similar concept throughout the Airport city to make it the first Smart AirportCity. (Willem)

- Could you describe how Schiphol Real Estate plans to move in this direction, especially with the already existing buildings, and some of the initiatives that are being taken for this?

Involvement of landlord

After the tenant moves into the office space, there are a large number of management styles in practice today which determine the type of interaction between the landlord and the tenant, such as post occupancy evaluations and monthly discussions with the tenants.

- How does Schiphol Real Estate as an office space provider look at this aspect, and currently are there any practices to increase interactions with the tenants?

FUTURE

Future challenges

Recently, Rabobank published a report saying that with the corona crisis, locations that offer a favourable business climate will be significantly affected- the agglomeration and cluster benefits might partially disappear.

- How do you see this affecting Schiphol as a business location in the future?

Are there any other points that you would like to mention that would contribute towards the research?

I would like to thank you for taking out the time and participating in this research. Also, if you would be interested, I would be happy to share the results of my research with you, once it is completed.

Appendix D: Interview Protocol Type 3

Introduction

I would like to thank you for agreeing to participate in this interview. The interview is a part of my Masters graduation research in the department of 'Management in the Built Environment' at the TU Delft. The graduation thesis focuses on the real estate developments in the Schiphol Airport area. Through this research, the aim is to understand the role that the knowledge-intensive corporations play in the real estate developments around the airport and their spatial demands and strategies.

The outcome of this interview gives the researcher an insight into the rationale behind companies choosing to locate at the Schiphol Airport, at the same time, to get an expert perspective on some of the findings from the previously held interviews. The interview will last for approximately 45 minutes, and I would like to remind you that this information would only be used for academic purposes. Accordingly, I would like to ask for your consent to record this interview, with the sole purpose of transcribing it, after this, the recordings will be deleted. Your answers in this interview will remain confidential.

Please keep in mind that you can refuse to answer any of the questions and you can withdraw from the study at any time. If you agree with this, I would like to thank you again for participating in this interview and kindly ask you to sign the Informed Consent Form.

INITIAL PHASE

Schiphol as a business location

In the past few years, Schiphol has become an emergent business location for a number of companies and the concept of an Airport City has been advocated by a number of authors.

- What do you think are some of the major advantages for corporations to locate at the Schiphol Airport that make it different from other business locations?

Dependence of landside development on aviation

A number of authors say that the landside developments at the airport depend on the aviation side of the business, whereas some of them deny this aspect.

- How do you perceive this relationship between the 2 sides?

Knowledge economy

- In today's emergent knowledge economy, how do you recognize Schiphol's role or potential in attracting knowledge intensive corporations?

Demand of type of office spaces

We know that for most of the corporations that decide to locate at Schiphol, the accessibility provided by the airport is one of the major factors that influence this decision. Along with this, if we look at the real estate provided by Schiphol Real Estate,

- Do you see a changing demand in terms of the type of office space (such as open floor plans or highly agile working spaces) that the corporations demand to locate at Schiphol?
- Do you see an increasing focus towards serviced offices or do corporations prefer to have the freedom to design and manage their own offices?

INTERVIEW FINDINGS

Currently, I have interviewed some of the companies located at Schiphol, and this includes different types of corporations, from 400 employees to about 10 employees at the office. Also, I have interviewed some of the office providers at Schiphol. Based on the findings from these interviews, I would like to understand your point of view on some of these topics.

Schiphol CBD vs Schiphol East

Within the Schiphol area, there is an extremely high demand for office spaces at the CBD, compared to Schiphol East. This is mainly because of the accessibility to the terminal and the quality of the office space at the CBD.

- Do you think this could be a challenge for Schiphol Real Estate in terms of the other areas not being as successful as the CBD? And how could they tackle this situation?

Real Estate demands

The findings from the demand side show that due to the airport location, these companies get a number of requests for European trainings and meetings to take place at their office. This shows a high demand for spatial flexibility for these offices.

- How important do you consider flexibility in the terms of the amount of office spaces offered at Schiphol for the companies?

The real estate demands vary according to the size of the company, wherein the bigger corporations usually have an accommodation strategy in place, whereas the smaller ones are more attracted to the shared services offered (like in the WTC).

- Do you think there are more variables, other than the size of the companies that affect their demands?

With the high levels of office rents at the airports, a few mature companies prefer to locate close by where the costs are lower and they can still enjoy the benefits on an airport.

- What role does the maturity level of the company play for its decision to locate at the airport? And how can airport authorities look to widen their market and attract all kinds of companies?

Core and peripheral portfolio

Currently, there is an even mix of companies who have either their core office or a satellite/ supporting office at Schiphol.

- Do you see a bigger opportunity for either of these offices at the airport, and if so how can the airport authorities cater to these types of demands?

Financial flexibility

As mentioned by few of the interviewees, providing financial flexibility can be seen as a way of optimising the space offered, while at the same time it can be seen as an attractive offer for certain types of companies, based on the industry they work in.

- Do you think different areas such as the CBD and Schiphol East could benefit from different approaches in terms of the type of lease contracts and their duration?

Business model of Schiphol

Currently Schiphol Real Estate follows a very traditional type of business model, in which they rent out their land or office spaces for long term contracts of say 10 years. At the same time the distribution between the aviation and non-aviation tenants is roughly 60 / 40.

- Do you see this as an efficient business model, and if not, how do you see that this can be further updated?

FUTURE

Future challenges

- Currently with the world facing the economic crisis and the aviation industry being especially hit by it, what impact do you see on the commercial real estate at airports?

There are certain reports being published which mention that office clusters might be affected in the long run with some of the benefits such as agglomeration and spatial proximity declining in the coming years?

- Do you consider this as a major challenge for Schiphol also as a business location?

Are there any other challenges that you think act as limiting factors for the office developments at the airport, that the authorities need to pay special attention to?

Are there any other points that you would like to mention that would contribute towards the research?

I would like to thank you for taking out the time and participating in this research. Also, if you would be interested, I would be happy to share the results of my research with you, once it is completed.

Appendix E: Details of the interviewees

Perspective	Case/ Corporation	Interviewee	Interviewee role	Form of interview	Date
Demand	Microsoft	A	Business and digital transformation lead, director	Face-to-face	20.02.2020
Demand	Samsung	B	Head of HR & GA for Benelux	Face-to-face	10.03.2020
Demand	John Laing Group	C	Senior Investment manager	Face-to-face	05.03.2020
Demand	KLM Digital Studio	D	PMO Digital transformation	Face-to-face	20.02.2020
Supply	Co-working provider	E	CFO	Face-to-face	28.02.2020
Supply	Schiphol Real Estate	F	Real Estate Developer	Telephone call	24.03.2020
Supply	Schiphol Real Estate	G	Senior Manager Development	Telephone call	23.04.2020
Expert	Real Estate consultancy	H	Senior Advisor	Webex meeting	19.30.2020
Expert	University of Hong Kong; Airport Urbanism; Urban Experts	Max Hirsh	Research professor; CEO; Author	Zoom meeting	28.04.2020
Expert	Airea; Airport City Academy	Pieter van der Horst	Managing Director; Co-founder	Zoom meeting	01.05.2020

Appendix F: Building numbers at Schiphol

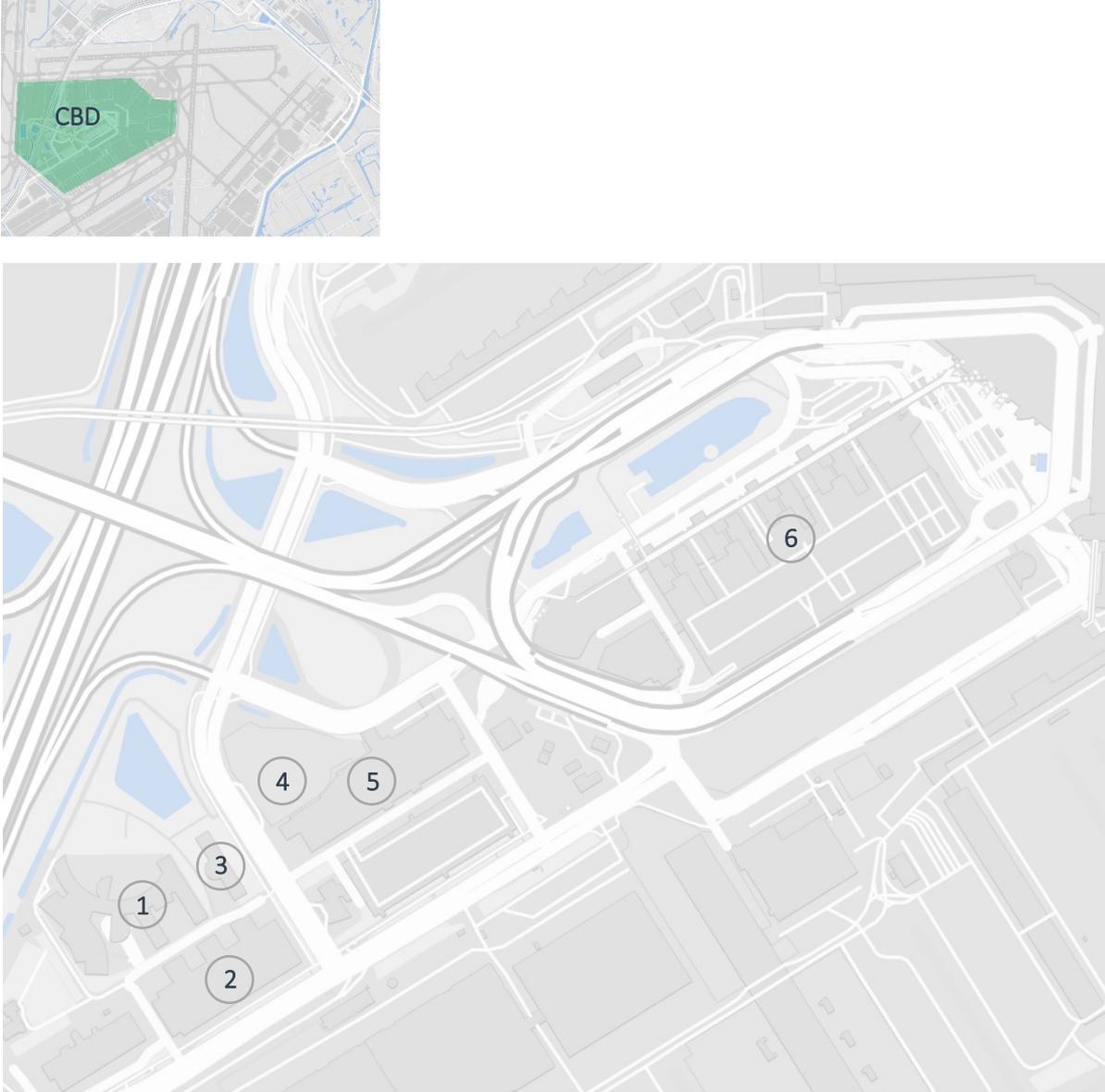


Figure a. The office buildings numbers in Schiphol CBD, corresponding to table 4

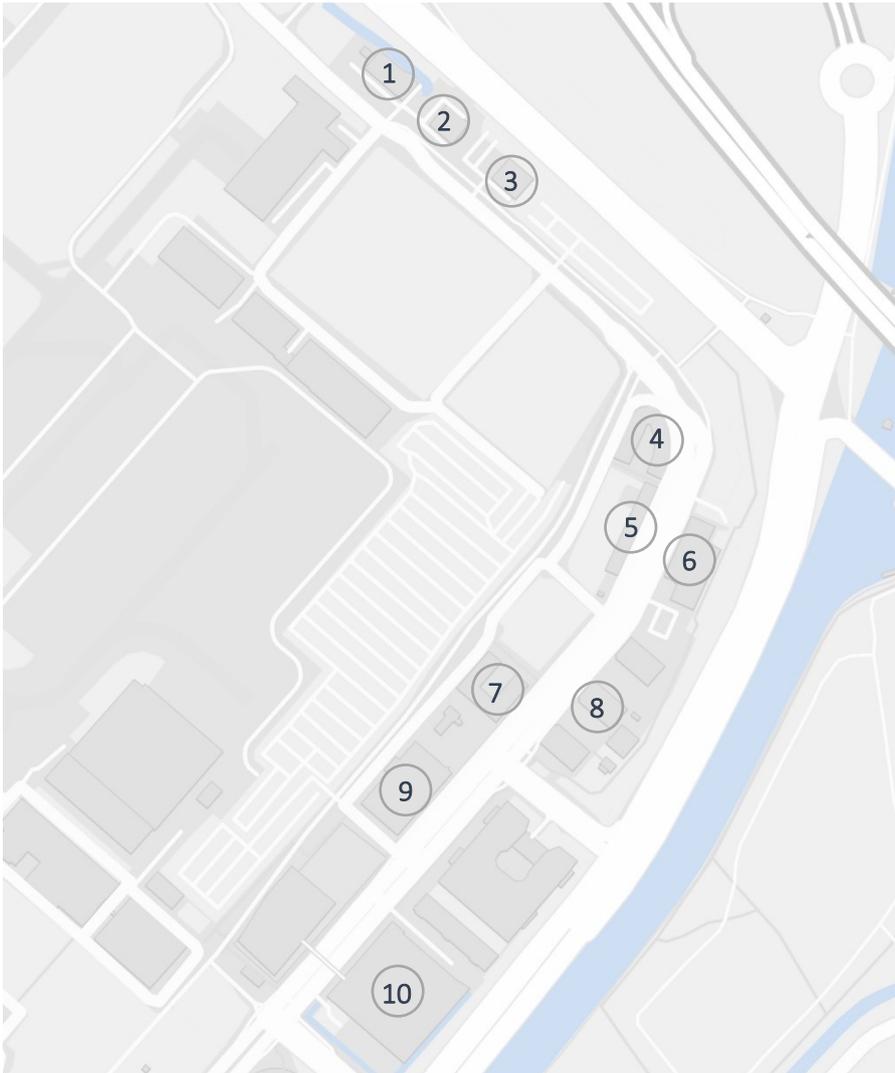


Figure b. The office buildings numbers in Schiphol East, corresponding to table 5

Appendix G: List of serviced office spaces at Schiphol

Number	Detail	Street Address
1	Spaces, Schiphol Airport	Evert van de Beekstraat 354, 1118 CZ Schiphol
2	The Office Operators- WTC Schiphol	Schiphol Boulevard 105, 1118 BG Schiphol
3	Regus Express, Schiphol	Reception Hall 4, Airport Schiphol, 1118 AX Schiphol
4	Regus- Schiphol Airport meeting center	Havenmeesterweg 27, 1118 CB Schiphol
5	The Base, Schiphol	Evert van de Beekstraat 104, 1118 CN Schiphol
6	Nest, Schiphol Oost	Stationsplein Noord-Oost 202 1117 CJ Schiphol-Oost

Appendix H: List of knowledge corporations at Schiphol

Advanced Producer Service (APS) corporations at Schiphol

No.	Name of corporation	Portfolio type	Street Address	SBI code (KvK)	SBI category	KE sub-category	Total assets	No. of employees
1	HAL Investments BV	Branch office	Schiphol Boulevard 123 Toren B, 7 etage 1118 BG Schiphol	6420	Financial holding company	Banking and finance	47.400.000.000	39
2	Svenska Handelsbanken AB	Branch office		64194	General banks	Banking and finance	4.200.000.000	
3	Capital Hospitality Management BV	Branch office	Schiphol Boulevard 373 1118 BJ Schiphol	6420	Financial holding company	Banking and finance		
4	John Laing Group	Branch office	Schiphol Boulevard 253 WTC, D-Tower 1118 BH Schiphol	7112	Engineers and other technical design and advice	Banking and finance		10
5	WP Stewart Asset Management NV	Branch office	Schiphol Boulevard 189 1118 BG Schiphol	66193	Mortgage and credit brokerage	Banking and finance	1.600.000	8
6	Luminescence Cooperative UA	Branch office	Evert van de Beekstraat 1 The Base 1118 CL Schiphol	6420	Financial holding company	Banking and finance	1.800.000.000	8826
7	Aravis Investments BV	Branch office	Evert van de Beekstraat Unit 104 1118 CL Schiphol	6420	Financial holding company	Banking and finance	100.500.000	
8	Pimco Europe	Headquarters	Schiphol Boulevard 315 1118 BJ Schiphol	6420	Financial holding company	Banking and finance		
9	DIF Management BV	Headquarters	Schiphol Boulevard 269 Tower D 1118 BH Schiphol	6420	Financial holding company	Banking and finance	55.500.000	
10	Citibank Europe	Headquarters	Schiphol Boulevard 257 WTC DT 1118 BH Schiphol	64194	General banks	Banking and finance		50-99
11	DVB Bank SE	Headquarters	Schiphol Boulevard 255 1118 BH Schiphol	64194	General banks	Banking and finance	23.000.000.000	50-99
12	Indigo Holdings BV	Headquarters	Schiphol Boulevard 353 1118 BJ Schiphol	6420	Financial holding company	Banking and finance	651.900.000	1595
13	Infopro Digital Group BV	Headquarters	Schiphol Boulevard 441 1118 BK Schiphol	6420	Financial holding company	Banking and finance	1.500.000.000	3357
14	Comidas Holdings Cooperative UA	Headquarters	Schiphol Boulevard 429 1118 BK Schiphol	6420	Financial holding company	Banking and finance	332.100.000	788

15	La Perlan Fashion Holding NV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	6420	Financial holding company	Banking and finance	152.900.000	1370
16	WebPros HoldCo BV	Headquarters	Schiphol Boulevard 369 1118 BJ Schiphol	6420	Financial holding company	Banking and finance	123.200	62
17	Vebege Airport Services BV	Headquarters	Schiphol Boulevard 199 1118 BG Schiphol	6420	Financial holding company	Cleaning services	9.700.000	193
18	SNC- Lavalin Europe BV	Branch office	Schiphol Boulevard 169 1118 BG Schiphol	6420	Financial holding company	Consultancy corporation	309.000.000	
19	Granton Marketing BV	Branch office	Schiphol Boulevard 173 1118 BG Schiphol	7490	Other specialist business services	Consultancy corporation	2.800.000	10
20	First Dutch Capital Group BV	Branch office	Schiphol Boulevard 225 Tower C, 5th floor 1118 BH Schiphol	6420	Financial holding company	Consultancy corporation	408.700	
21	Alliance Bernstein Ltd.	Branch office	Schiphol Boulevard 189 WTC 1118 BG Schiphol	70222	Management and operational management	Consultancy corporation	151.000.000	188
22	Hitachi Consulting Belgium BVBA	Branch office	Schiphol Boulevard 127 1118 BG Schiphol	70221	Organizational consultancy firms	Consultancy corporation	6.200.000	50-99
23	Secure Move Europe Investigations Agency BV	Headquarters	Anchoragelaan 50 1118 LE Schiphol	8010	Private security	Consultancy corporation	162.300	
24	Menzies Security Services BV	Headquarters	Anchoragelaan 50 1118 LE Schiphol	8010	Private security	Consultancy corporation	377.900	10
25	DCG Interholding BV	Headquarters	Reykjavikweg 2 1118 LK Schiphol	6420	Financial holding company	Consultancy corporation	802.400	
26	Compris Consulting BV	Headquarters	Schipholweg 655 1175 KR Lijnden	7112	Engineers and other technical design and advice	Consultancy corporation	1.900.000	
27	Airplus Servicekarten GmbH	Headquarters	Evert van de Beekstraat 1 1118 CL Schiphol	7320	Market and opinion research bureaus	Consultancy corporation		
28	Dutch Living Services BV	Headquarters	Evert van de Beekstraat 1 The Base A 1118 CL Schiphol	7490	Other specialist business services	Consultancy corporation	264.000	
29	AMS Sourcing BV	Headquarters	Schiphol Boulevard 245 Schiphol D-5 1118 BH Schiphol	7320	Market and opinion research bureaus	Consultancy corporation	6.200.000	36
30	Executive Mobility Group BV	Headquarters	Evert van de Beekstraat 1 1118 CL Schiphol	70221	Organizational consultancy firms	Consultancy corporation	336.000	
31	GSA Facilitaire Diensten BV	Headquarters	Walaardt Sacrestraat 437 1117 BM Schiphol	8110	Facility management	Consultancy corporation	8.100.000	54
32	Icts International NV	Headquarters	Walaardt Sacrestraat 425 1117 BM Schiphol	8010	Private security	Consultancy corporation	63.100.000	7125

33	Tennor Holding BV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	6420	Financial holding company	Consultancy corporation	953.700	27
34	Buro De Werkstudent Projecten BV	Branch office	Evert van de Beekstraat 1-32 1118 CL Schiphol	78201	Employment services	Information and communication	22.100	
35	Association of KLM Professionals	Branch office	Stationsplein 230 Building 144 1117 CJ Schiphol	9420	Employee organization	Information and communication		
36	Cheil Benelux BV	Branch office	Evert van de Beekstraat 310 1118 CX Schiphol	7311	Advertising agencies	Information and communication	9.600.000	30
37	Cobra Group Holdings BV	Branch office	Schiphol Boulevard 195 Tower A 1118 BG Schiphol	6420	Financial holding company	Information and communication	16.600.000	9
38	Spirit Hostess Servoess Promo Ad- viezen BV	Headquarters	Thermiekstraat 30 1117 BC Schiphol	8219	Secreterial services	Information and communication	3.500.000	154
39	Yask Airport Information BV	Headquarters	Schiphol Boulevard 199 1118 BG Schiphol	5223	Aviation services	Information and communication		50-99
40	Yandex NV	Headquarters	Schiphol Boulevard 165 1118 BG Schiphol	6420	Financial holding company	Information and communication	3.000.000.000	8767
41	Samsung Electronics Overseas BV	Headquarters	Evert van de Beekstraat 310 1118 CX Schiphol	4652	Wholesale of electronic and telecommunication equipment	Information and communication	85.600.000	
42	Appco Group Holdings BV	Headquarters	Schiphol Boulevard 195 Tower A 1118 BG Schiphol	6420	Financial holding company	Information and communication	94.200.000	474
43	One Network BV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	6209	Other information technology service activities	Information and communication		
44	ServiceTec Airport Operations Netherlands BV	Headquarters	Evert van de Beekstraat 1 Unit 104 1118 CL Schiphol	9511	Repair of computers and peripheral equipment	IT Management and consulting	362.400	21
45	Microsoft BV	Headquarters	Evert van de Beekstraat 354 1118 CZ Schiphol	6202	Information technology consultancy	IT Management and consulting	590.900.000	865
46	Sonata Software Limited	Headquarters	Schiphol Boulevard 359 D Tower 1118 BJ Schiphol	6202	Information technology consultancy	IT Management and consulting	148.000.000	3090
47	Gaastra Advocaten BV	Headquarters	Schiphol Boulevard 345 Tower D 1118 BJ Schiphol	69101	Law firms	Law and insurance	595.300	8
48	Wereldhave NV	Headquarters	Schiphol Boulevard 233 WTC 1118 BH Schiphol	64301	Investment institutions in financial assets	Real estate management and investment	3.500.000.000	165

49	GSFS Asset Management BV	Branch office	Evert van de Beekstraat 49 1118 CL Schiphol	6831	Intermediation in trade, rental of real estate	Real estate management and investment	136.900	
50	CBRE Global Investors BV	Headquarters	Schiphol Boulevard 281 1118 BH Schiphol	4110	Project development	Real estate management and investment	103.200.000	
51	Kroonenberg Groep BV	Headquarters	Schiphol Boulevard 181 WTC Building 1118 BG Schiphol	6810	Trade in own real estate	Real estate management and investment	3.000.000.000	49
52	WTC Business and Conference Centre BV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	6832	Property management	Real estate management and investment	2.200.000	
53	Schiphol Real Estate BV	Headquarters	Evert van de Beekstraat 202 1118 CP Schiphol	6810	Trade in own real estate	Real estate management and investment	2.000.000	50-99
54	Schiphol Area Development Company NV	Headquarters	Evert van de Beekstraat 356 1118 CZ Schiphol	4110	Project development	Real estate management and investment	119.000.000	27
55	Schipholland Wildeboer BV	Headquarters	Schiphol Boulevard 251 1118 BH Schiphol	6831	Intermediation in trade, rental of real estate	Real estate management and investment	306.500	
56	Houses 4 Rent BV	Headquarters	Stationsplein 292 1117 CJ Schiphol	6831	Intermediation in trade, rental of real estate	Real estate management and investment	26.300	
57	Association Amsterdam Airport Area	Headquarters	Evert van de Beekstraat 356 1118 CZ Schiphol	7320	Market and opinion research bureaus	Real estate management and investment	517.600	
58	Unibail-Rodamco SE	Headquarters	Schiphol Boulevard 371 WTC Schiphol 1118 BJ Schiphol	68204	Rental of real estate	Real estate management and investment	64.500.000.000	2027
59	West World Holding NV Investment	Headquarters	Schiphol Boulevard 233 WTC 1118 BH Schiphol	64302	Investment institutions in fixed assets	Real estate management and investment	710.500.000	
60	New Tower Real Estate BV	Headquarters	Schiphol Boulevard 371 Tower H 1118 BJ Schiphol	64301	Investment institutions in financial assets	Real estate management and investment	189.200.000	
61	Dutch Active Fund PropCo BV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	64301	Investment institutions in financial assets	Real estate management and investment	126.900.000	
62	Principal Real Estate BV	Headquarters	Schiphol Boulevard 127 1118 BG Schiphol	68204	Rental of real estate	Real estate management and investment	23.800.000	
63	HAFOK BV	Headquarters	Evert van de Beekstraat 202 1118 CP Schiphol	4110	Project development	Real estate management and investment	8.000.000	
64	Seko Benelux BV	Branch office	Valkweg 1 1118 EC Schiphol	52291	Forwarders, brokers, shippers	Transport and logistics	6.000.000	40

65	AviationPlus BV	Headquarters	Flamingoweg 31 3rd Floor 1118 EE Schiphol	52291	Forwarders, brokers, shippers	Transport and logistics	2.800.000	6
66	RDS Intertrans BV	Headquarters	Flamingoweg 8 8 room 268 1118 EE Schiphol	52291	Forwarders, brokers, shippers	Transport and logistics	447.300	8
67	Roadfeeders Holland BV	Headquarters	Folkstoneweg 48 1118 LM Schiphol	4941	Frieght transport by road	Transport and logistics	304.000	2
68	AerCap BV	Headquarters	Evert van de Beekstraat 1 1118 CL Schiphol	7735	Rental and lease of aircraft	Transport and logistics	2.700.000.000	114
69	Inflight Logistics Company BV	Headquarters	Pelikaanweg 2 1118 DX Schiphol	52991	Forwarders, brokers, shippers	Transport and logistics	4.100.000	11
70	Rhenus BV	Headquarters	Walaardt Sacrestraat 401 1117 BM Schiphol	52991	Forwarders, brokers, shippers	Transport and logistics	92.000.000	934
71	Heineken NV	Headquarters	The Base D Evert van de Beekstraat 104, 1118 CN Schiphol	70102	Holdings (no financial)			

High Tech corporations at Schiphol

No.	Name of corporation	Portfolio type	Street Address	SBI code (KvK)	SBI category	KE sub-category	Total assets	No. of employees
1	Wanhua Chemical Netherlands BV	Branch office	Schiphol Boulevard 301 1118 BJ Schiphol	2059	Manufacture of other chemical products	Chemistry & Pharmacy	9.300.000	6
2	Combisafe Nederland BV	Branch office	Stationsplein ZW 961 Tristar 1 1117 CE Schiphol	2229	Manufacture of plastic products	Chemistry & Pharmacy	1.000.000	
3	Croonwolter & dros BV	Branch office	Gebouw Columbus, Folkstoneweg 18 1118 LM Schiphol	43222	Installation of heating and air conditioning	Construction & installation		19
4	TBK Beheer and Onderhoud BV	Branch office	Stationsplein NO 214 1117 CJ Schiphol	43221	Plumbing and fitting works	Construction & installation	1.600.000	19
5	Heijmans	Branch office	Flamingoweg 29 3e Etage 1118 EE Schiphol	43221	Plumbing and fitting works	Construction & installation	52.000.000	1326
6	IBK Groep BV	Branch office	Stationsplein NO 328 1117 CK Schiphol	332212	Installation of machines and equipment	Construction & installation	5.400.000	7
7	Deerns Nederland BV	Branch office	Stationsplein NO 428 1117 CL Schiphol	7112	Engineers and other technical design and advice	Construction & installation	18.100.000	203
8	BAM Infra Energy & Water West BV	Branch office	Valkweg 6 1118 EM Schiphol	4120	General civil and utility construction	Construction & installation		150
9	BRI Klimatechniek BV	Branch office	Stationsplein NO 202 Gebouw 144 1117 CJ Schiphol-Oost	4321	Electrotechnical building installation	Construction & installation	3.100.000	38
10	Breijer Techniek West BV	Branch office	Evert van de Beekstraat 326 7e etage 1118 CX Schiphol	7112	Engineers and other technical design and advice	Construction & installation		55
11	Facilicom Solutions BV	Branch office	Expeditiestraat k2/138 1118 AL Schiphol	8110	Facility management	Construction & installation	53.400.000	788
12	Engie Services Nederland NV	Branch office	Schiphol Boulevard 297 1118 BH Schiphol	70102	Holdings (no financial)	Industry and energy company	381.600.000	5786
13	Nutricia Research BV	Branch office	Schiphol Boulevard 105 1118 BG Schiphol	72193	Research and development in health and nutrition	Industry and energy company		
14	PNO Consultants BV	Branch office	Evert van de Beekstraat 366 II 1118 CZ Schiphol	70221	Organizational consultancy firm	Industry and energy company	6.200.000	185

15	Danone Trading BV	Branch office	Schiphol Boulevard 261 Toren E 1118 BH Schiphol	46331	Wholesale of dairy products and edible oils	Industry and energy company		300
16	Delta Hydrocarbons BV	Branch office	Schiphol Boulevard 175 1118 BG Schiphol	6420	Financial holding company	Industry and energy company	58.100.000	
17	Cargill BV	Branch office	Evert van de Beekstraat 378 1118 CZ Schiphol	10822	Manufacture of chocolate and confectionery	Industry and energy company	2.000.000.000	2152
18	Reckitt Benckiser BV	Branch office	Schiphol Boulevard 267 1118 BH Schiphol	46442	Producer of health, hygiene and other products	Industry and energy company	835.300.000	148
19	Elsenga Installatietechniek BV	Branch office	Transportstraat 228 1118 CR Schiphol	4321	Electrotechnical building installation	Machinery & vehicle industry	1.300.000	35
20	Fiat Netherlands Holding BV	Branch office	Schiphol Boulevard 217 WTC 1118 BH Schiphol	6420	Financial holding company	Machinery & vehicle industry	38.500.000.000	
21	Mercedes-Benz Cars Netherlands	Branch office	Pelikaanweg 12 1118DX Schiphol	45191	Import of new cars	Machinery & vehicle industry	258.500.000	84
22	Gomes Noord Holland BV	Branch office	Cateringweg 19 1118 AM Schiphol	45112	Trade and repair of passenger cars	Machinery & vehicle industry	38.000.000	270
23	Spider Engineering BV	Branch office	Stationsplein N-O 202-400 1117CJ Schiphol	7112	Engineers and other technical design and advice	Machinery & vehicle industry	200.200	
24	Enraf BV	Branch office	Stationsplein ZW 961 Tristar 1 1117 CE Schiphol	2651	Manufacture of measurement and control equipment	Machinery & vehicle industry		
25	STMicroelectronics NV	Branch office	Schiphol Boulevard 265 1118 BH Schiphol	6420	Financial holding company	Machinery & vehicle industry	10.100.000.000	45953
26	SITA NV	Branch office	Vertrekpassage 238 1118 AV Schiphol	6420	Financial holding company	Telecommunications	968.000.000	4864
27	KPN Mobile NV	Branch office	Flamingoweg 21 Kamer 032 1118EE Schiphol	6190	Other telecommunications	Telecommunications	14.300.000.000	5620
28	ECI Telecom Holdings BV	Branch office	Folkstoneweg 32 1118 LM Schiphol	6201	Developing, producing and publishing software	Telecommunications	52.400.000	
29	Technical Trading Company Europlex BV	Headquarters		46751	Wholesale of chemical raw materials	Chemistry & Pharmacy	2.100.000	19
30	NatureWorks BV	Headquarters	Evert van de Beekstraat 378 1118 CZ Schiphol	72192	Technical research and development work	Chemistry & Pharmacy	26.500.000	
31	Sineth Engineering BV	Headquarters	Stationsplein No 262 1117 CJ Schiphol	7112	Engineers and other technical design and advice	Construction & installation	403.800	11
32	Active Building Maintenance BV	Headquarters	Walaardt Sacrestraat 437 1117 BM Schiphol	7112	Engineers and other technical design and advice	Construction & installation	1.900.000	34

33	Perfetti van Melle Group BV	Headquarters	Stationsplein 997 Tristar 3 1117 CJ Schiphol	6420	Financial holding company	Industry and energy company	1.800.000.000	14939
34	LM Wind Power BV	Headquarters	Schiphol Boulevard 357 1118 BJ Schiphol	6420	Financial holding company	Industry and energy company	17.800.000	59
35	JKX BV	Headquarters	Schiphol Boulevard 283 Tower F 1118 BH Schiphol	6420	Financial holding company	Industry and energy company	144.400.000	
36	Trafigura Beheer BV	Headquarters	Evert van de Beekstraat 82, The Base 1118 CL Schiphol	6420	Financial holding company	Industry and energy company	46.000.000.000	4316
37	SBM Offshore NV	Headquarters	Evert van de Beekstraat 1 1118 CL Schiphol	6420	Financial holding company	Industry and energy company	9.300.000.000	5530
38	Honeywell Netherlands Holding BV	Headquarters	Stationsplein- ZW 961 Tristar 1 1117 CE Schiphol	6420	Financial holding company	Industry and energy company	1.500.000.000	1494
39	RockRose Infrastructure BV	Headquarters	Schiphol Boulevard 359 WTC 1118 BJ Schiphol	901	Services for extraction of oil	Industry and energy company	30.800.000	
40	Ecotechnology & Financing BV	Headquarters	Schiphol Boulevard 403 1118 BK Schiphol	6420	Financial holding company	Industry and energy company	78.000.000	21
41	EIS Holanda BV	Headquarters	Evert van de Beekstraat Unit 104 1118 CL Schiphol	2812	Manufacture of hydraulic equipment	Industry and energy company	58.300.000	
42	Puma Energy Bitumen Holdings BV	Headquarters	Evert van de Beekstraat 82, The Base 1118 CL Schiphol	6420	Financial holding company	Industry and energy company		
43	Metallo Holdings 3 BV	Headquarters	Schiphol Boulevard 423 1118 BK Schiphol	6420	Financial holding company	Machinery & vehicle industry	361.300.000	506
44	Schiphol Telematics BV	Headquarters	Evert van de Beekstraat 202 1118 CP Schiphol	6190	Other telecommunications	Telecommunications	44.100.000	
45	Terremark Netherlands	Headquarters	Cateringweg 5 1118 AM Schiphol	6311	Data processing, web hosting	Telecommunications		
46	Teleplan International NV	Headquarters	Schiphol Boulevard 201 1118 BG Schiphol	7112	Engineers and other technical design and advice	Telecommunications	112.000.000	5236