Macromedia

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Bachelor Thesis

Media & Communication Management

Digital advertising in the public limited environment.

A market-entry approach for the LED textile Lumalive

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written by

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Executive Summary

Within the framework of a bachelor thesis, the requirements for a market-entry got analysed, regarding the programmable textile Lumalive from Royal Philps. As a potential target market, the advertising industry got chosen. Moreover, the Lumalive fabric is to be implemented into the out-of-home environment as a digital screening surface on which advertisement can be placed in future. Due to Lumalive´s conformable texture, an installation into public furniture is feasible and it is an essential part for the implementation into the public limited environment of restaurants.

This approach got established to launch a market re-entry, hence the technology already got exploited in the years 2007-2008, which resulted in a market failure.

The knowledge that was needed for the development of this implementation approach got retrieved from three qualitative expert interviews. Next to the literature that was used in this paper, these interviews devised the requirements which would be essential to achieve the market-entry. The statements of each participant from the gastronomy, the advertising industry and the technology industry, have been treated as the representing statements of the whole industry, which they are presenting.

Within a comparison between Lumalive textile and an imprinted banner textile, it got reviled, that the LED technology of Lumalive outperforms imprinted ad-tools in terms of costs. Furthermore, Lumalive disposes qualitative characteristics, like the multiple usability which enables the cost per square metre to decrease. The thesis also elaborates on the fact, that a relaunch of production would need to consider an increase of Lumalive´s display resolution.
These cost factors and quality factors were taken into account in the establishment of the implementation approach. Herby, the type of advertisement plays an important role when placing product communication at places which are hubs for interpersonal communication. It got concluded that implicit advertisement could become they type of ad, that can be displayed on Lumalive installed in a parasol.

With this implementation approach and Lumalive´s ability to outperform imprinted OOH media in terms of costs and quality, a possible market entry for the LED textile became realisable.

Key Terms

→Lumalive

→Digital Out-of-Home

→Market-entry

→Advertising

→Gastronomy

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List of Abbreviations

AD	Advertising
B2B	Business to Business
B2C	Business to Consumer
CPM	Cost Per Mil.
DB	Deutsche Bahn
DOOH	Digital Out Of Home
DPI	Dots per Inch
FMCG	Fast Moving Consumer Good
GfK	Gesellschaft für Konsumforschung
HD	High Definition
LED	Light Emitting Diode
OOH	Out of Home
POS	Point of Sale
TKP	Tausend Kontakt Preis

1 Introduction

In a modern society in which people are constantly mobile and information of any form is stimulating the consumer in transit, advertisers have a hard job to polarise with product communication.

Nevertheless, marketers have realised that outdoor environments are still lucrative areas in which advertisements are recognised and efficient. Outdoor advertisements, also called out-of-home (OOH), can come in any size and shape, which is why they can often become an eye-catcher in the public environment. They are also location based, which gives this type of media the opportunity to display location based ads. In addition, the terminology of big data has gained momentum in the targeting process of product communication. This is why advertisers are trying to find digital solutions, that can solve the issue of targeting in the OOH environment.

Similar to online advertising, the engagement with potential customers shall be achieved by supplying targeting data to digital ad-spaces, on which advertisements with the same targeting criteria can be placed. It is assumed, that this method of ad placement decreases the number of misguided media budgets.

This bachelor thesis elaborates on a technology, which could enable the programmatic displaying of advertisement similar to existing LED screens. Unlike solid screens, the technology discussed in this paper is conformable and has characteristics of textile. Thus, a variety of applications become imaginable. The media industry is hoping, that new business models will deliver new sources of revenue, especially through digital platforms (Albarran, 2009).

Therefore, the hypothesis of this dissertation is stated as follows. Lumalive can achieve a market entry into the advertising industry as soon as it can outperform another advertising tool in terms of cost and quality.

In the following, it will be examined, if the Lumalive technology has the potential to achieve a market entry as a digital out-of-home media tool.

2 Methodology

In the methodology chapter, the groundwork for the empirical approach is being elaborated. Within the methodology, the execution of expert interviews will be explained and the purpose of this qualitative research method will be outlined. Furthermore, the main terminologies are getting explained to allow a gables reading with little interruptions. Terminologies, such as media, out-of-home and targeting are seen to be the core elements of this paper. These terms are can be associated with the digitalization of outdoor media and the market entry approach in this paper.

2.1 Empirical Tool

For the purpose of a qualitative empirical research, three interviews were conducted with experts from three different industries. Table 1 is visualising the expert interviews.

Interview 1: Koen van Os	Philips Lighting	Senior Scientist	04.11.2016
Interview 2: Tom Lichtenstein	Vapiano	Operations Manager	29.11.2016
Interview 3: Claudia Zayer	Jost v. Brandis	OOH Media Planner	01.12.2016
Table 1: Interview partners. Own Graphic, 2016			

The interviews were conducted in order to find out how the market entry would affect the parties surveyed and will provide insights as to whether the programmable fabric Lumalive has the potential to work as an advertising media tool or not.

2.1.1 Definition

For this thesis, the definition of an expert interview was retrieved from Gläser and Laudel. They mention, that an expert interview is a methodology to access knowledge, which is retrieved from a so called expert. The expert is defined to be a member of an economical elite who has knowledge at his disposal about a certain topic. It is the knowledge about social contexts within specific working processes, organizational structures and data processes that makes up an expert. (Gläser & Laudel, 2010) In most scenarios an expert should provide a minimal amount of work experience of about ten years. With regards to the media industry and the topic of digitalisation, the quality of work experience is far more important than the amount of time spend. Since the modern

digital media industry is not mature enough to have someone employed for that long, experts have been chosen who are directly involved in the working processes that are needed for the evaluation of Lumalive´s market re-entry. The different statements of each interviewee will either disprove or foster the paper´s hypothesis. The interviewee's statements are used throughout the paper as direct and indirect quotes.

2.1.2 Justification

Expert interviews were conducted to acquire qualitative data. Specific knowledge of their fields of work will be evaluated throughout this paper in order to determine requirements that will be necessary for a possible entry into the business to business (B2B) market. The experts were chosen with regards to their working heritage because they represent the market segments in which Lumalive could become a lucrative product for business. The market segments that are getting represented through the experts are the media industry, the lighting industry and the food service industry.

The lighting industry that is represented by Philips Lighting, provides the research object for this paper, which is the Lumalive fabric. The possible client for Lumalive could become advertisers who are interested in using the programmable fabric as an advertising space. Thus, the media agency Jost von Brandis represents the media market because they would have to monitor the media content for advertisers. Furthermore, the market segment of the food service industry is represented by the system gastronomy Vapiano. The implementation of Lumalive into the system gastronomy is at the same time an advertising approach in the public limited environment. The concept of a public limited environment will be explained later in the paper due to its relevance for the context of the section 3.2.3.

The first expert interview was conducted with the senior scientist Koen van Os from Philips lighting. He started working for Philips in the year 2000 and worked in the field of micro assembling of hard-core electronics. He investigated large-area conformable electronics for the integration into textiles and other soft materials. He is also investigating, how materials can be build around a light source, rather than building the light source itself (v. Os, 2016). Van Os´s knowledge in the field of lighting provided most of the prior insights about the Lumalive fabric and its technological characteristics.

The conversation also aimed at collecting information about the resolution quality of Lumalive as a screening surface. Another motivation for this expert interview was, to find out the barriers to a market entry, that caused an entry failure in 2008.

The second expert interview was conducted with Tom Lichtenstein, who is the operating manager of the Vapiano restaurants in the northern region of Germany, covering the cities of Bremen, Hamburg and Hannover. He is responsible for 320 employees in 5 restaurants. Lichtenstein´s field of work covers the expansion of restaurants into new locations and also reassures the standard compliances in each restaurant (Lichtenstein, 2016). Since 2002 Vapiano is one of the leading system gastronomies, which started its franchise history in the German city of Hamburg. Worldwide there are now 168 franchisees on all five continents (Vapiano.com, 2016)
Vapiano was chosen as a member of the food service industry for this dissertation, because of its established global network. Furthermore, the standardised franchise system makes small changes with a wide ranging impact possible. This also drove the decision, with regards to the thesis, to approach Vapiano with an interview. An established infrastructure in a market is said to be a key requirement for the successful implementation of a new technology (Zayer, 2016). Since lighting is getting used to visualise different moods in restaurants, the concept of light emitting textiles would be knotting on a pre-existing infrastructure. Section 4.1 will explain, how the infrastructure of a system gastronomy like Vapiano can make the implementation of Lumalive possible. Additionally, the temper towards the topic of advertisement in and outside of gastronomies, was analysed during the interview. His statements about the implementation of advertising in restaurants, will contribute to the conceptual market entry approach mentioned later in section 4 of this dissertation.

A third interview was conducted together with members of the media market. More precisely, the interview was applied at the media agency Jost von Brandis (JvB), an out-of-home media agency which is a subsidiary company of WerbeWeischer. Their knowledge about advertising in the public environment is vital to this paper and will be mentioned in a wider scope in chapter 3.2. Media agencies are concerned with the controlling of advertising content throughout different channels (Zayer, 2016). Hence, they possess expert insights about different advertising tools and their suitability as such. The interview questions with the members of JvB shall provide valuable knowledge, which can be applied on a new possible medial network.

2.1.3 Conduction

Each expert interview was conducted on the bases of a guideline. Between eight to ten questions built the frame of each guideline. This guideline was communicated to the interviewee prior to the interview, in order to prepare the interview participant. Each expert received the guideline questions at least two days before the oral interview. This timing of communication provided a framework of high quality to the thesis, due to the briefing. On the interview date, information material such as a brochure and a PowerPoint presentation, which related to the interview questions, was made available by two of the interviewees. All interviews were held personally in a face to face conversation.

The Interview with Koen van Os was conducted on the High Technology Campus of Eindhoven, where the research and development department of Philips lightning is located. The interview with van OS was build around a power-point presentation, he prepared. This PowerPoint presentation can be found on the CD attached to this paper. In this he introduced himself and his field of work at Philips lighting. The presentation outlines the concept of how to build materials around a light source and the steps, that led to the development of Lumalive. Although the interview was fostered by van Os´s presentation, the guideline-questions were conducted and answered. In an email after the interview, he sent a valuable link to some technological information about LED´s.

The second interview with the media agency Jost van Brandis, was conducted with the digital department manager Claudia Zayer. The author of this thesis directed the conversation by applying the interview guidelines. The guideline questions were given to Claudia Zayer four days before the interview. For some questions, she had to ask co-workers for assistance. For example, the OOH media-planner Martina Fröhlich and the Ambient media-planner Judith Mennicke, that work in her department, were asked to give their insights into the research. Although, some answers didn’t come from Zayer directly, she confirmed each statement and validated them. Hence, the statements from the JvB interview, are quoted as the statements of Claudia Zayer.

The interview with the gastronomy expert Tom Lichtenstein was conducted at the Vapiano restaurant in Hamburg Gänsemarkt. Similar to the other expert interviews, Lichtenstein was asked the questions according to the guideline principles. He provided information about the usage of light within the Vapiano restaurants. Furthermore, after

the interview was conducted, he suggested a visit to one of the new locations of Vapiano in Bergedorf. The restaurant was in construction phase and was about to open one week after the visit. Tom Lichtenstein acted as a guide on the construction side and explained several tools which are implicitly influencing the restaurant´s atmosphere such as sound, visual effects and lighting.

2.2 Terminologies

The following section of this paper explains the main terminologies and will provide a brief understanding of the principles and theories used in this Bachelor thesis. The terms used in the paper have been part of the syllabus throughout the studies of the author. Especially the studies of Marketing and Media Communication contribute to this paper.
Terminologies that are being explained in the subsequent section are the concepts of media, its subcategory OOH media and the concept of targeting.

2.2.1 Media

For the purpose of this paper, the term media refers to the communication channels through which news, entertainment, education, data or promotional messages are being delivered (businessdictionary.com, n.d.).
When one is using the word media, it is commonly used in its plural form because it originates from the Latin plural of medium. The messages that are getting delivered via the different media are designated to be the media content of a communicative process. Advertising is often attached to this content in order to reach a desired target group with specific needs. This happens throughout a variety of media such as television, newspaper, radio, internet and OOH. Within these different media, there are different media formats, which are distinguished from each other by size and shape. With regards to out-of-home and for the purpose of this paper, these different formats are to be seen as media formats.

2.2.2 OOH Media

The focus of this paper is the implementation of Lumalive into a new market. Hence, the advertising industry was chosen to analyse the causes and effects that a new technology will bring. In doing so, a comparison to existing out-of-home (OOH) advertising tools will be made.
OOH can be understood as the overall term for media that can be accessed and consumed in the public environment without paying for it (Fachverband

Medienproduktion e.V., n.d.). An example for one OOH tool is a printed advertising poster. Other types of OOH ad-tools will be listed and explained in section 3.2 of this paper.

OOH media does not mean, that the advertising tool is necessarily placed in outdoor locations but instead it is placed anywhere outside of someone's private living space. OOH media can be used for informational purposes but also for entertainment purposes. Most commonly, OOH media is used to convey messages of product communication such as advertising and public relations.

Product communication that is placed on OOH Media allows to reach target groups at specific locations (Zayer, 2016). It gains a lot of attention and is therefore a lucrative method to reach consumers out of their homes (Weischer, 2010).

Typical places for OOH media are pavements, road-sides, train stations, airports and public limited environments. The term public limited environment (PLE) will be explained later in the paper due to its relevance for the context in section 3.2.3. Additionally, the present and continous digitalisation has transformed traditional OOH media. Info screens and LED billboards are ornamenting urban areas and the information portrayed does not have to be static anymore. With the help of geo-targeting and traffic-targeting, these screens are gaining importance for the advertising industry. The definition of targeting will be elaborated in the following section, which will be explored in the next section.

2.2.3 Targeting

Targeting describes the selection of potential clients with whom an undertaking wishes to exchange goods or services (businessdictionary.com, n.d.). In a targeting strategy, marketing managers are segmenting the market into market-segments with special characteristics. A marketing manager´s core competence should therefore lie in the understanding of the consumers' needs and wants. According to these different needs and wants of a target group, special channels and styles of communication can be used to interact with a potential customer. Therefore, advertising campaigns use targeting strategies to minimize forms of communication to non-potential consumers. This is also stated in an interview with Claudia Zayer, the digital department manager of Jost von Brandis, who said, that targeting is helping the campaign to achieve high figures of reach and low figures of divergence loss (Zayer, 2016).

For the purpose of this thesis, the term reach is being described as the number of people in the audience that is reached by the advertisement at least once in a specific time

period (Farris et al, 2016). With regards to the reach of a campaign, OOH is an advertising medium with the widest reach compared to others such as TV or Print and it is also the medium with the highest divergence loss (Zayer, 2016). According to Zayer, as a professional digital media planer, campaigns should always be communicated via diverse media so that the targeting focusses on a variety of channels which potential clients are using. OOH media should not be the only communicational tool in a campaign, otherwise the divergence loss would be too high (Zayer, 2016).

Due to the digitalisation of printed media, targeting becomes more granular with the help of the data which can be used for it. Digitalisation does not only affect the reading preferences of a newspaper-readership, but also the way in which advertising can be placed throughout different channels.

Advertisers are concerned with the process of optimisation throughout a campaign. Optimisation refers to the targeting strategy of segmenting a market using this segmentation for a divergence-loss-free communication (Zayer, 2016). When there is a large divergence loss, the consumers may feel annoyed by advertising, as it is not tailored to their needs. This concern has also been mentioned in an interview published by the Horizont magazine, in which Christof Baron, the CEO of the media agency Mindshare, states, that the industry mustn't annoy their consumers with advertisements (Ansorge, 2016). A possible solution to Barons statement are said to be Ambient media and the new digital out-of-home (DOOH) approach which is simple to monitor and which can be optimised continuously (Zayer, 2016).

Examples of digital OOH and the processes of targeting, that enabling this advertising approach, are mentioned in section 3.2. With the successful implementation of a new digital media into the OOH market, this dissertation will show a new possibility of targeting potential clients.

3 Empirical Approach

In the following section, the internal and external requirements for Lumalive´s market entry will be examined with primary and secondary data. The internal factors that are required for a market entry will be retrieved, when comparing cost and quality measures of Lumalive with an existing imprinted media tool in the market. The external requirements for the market-entry are set by the advertising market, as Lumalive could be successful in this sector. The advertising industry as an external factor will be analysed towards its level of digitalisation, especially in the field of OOH advertising. The comparative analysis of the internal factors will be applied at the end of chapter three in order to summarize the technical requirements for a market entry. The external factors such as the stakeholders of the implementation approach will be discussed in chapter four. As a conclusion for this paper, both external and internal requirements will be summarised to formulate a concluding statement for a potential market entry of Lumalive.

3.1 Lumalive Fabric

Lumalive is an electronic textile that was invented by Koen van Os who is working for Royal Philips in the field of consumer electronics. He started to work allot with the 3D-printing technology in order to create the different components of the LED´s. Furthermore, he is responsible for the product and process developments with a strong focus on industrialisation by bridging the gap between electronic and textile industries. Philips was the first company that tried to combine lighting with fabric. This is why they have filed the patent of Lumalive in 2005 (v. Os, 2016). Philips` object for patent is a flexible LED panel which possesses the ability to adjust its surface-shape similar to conventional clothing fabric. In this approach, arrays of LEDs are mounted on fabrics sewn with conductive yarns that will adjust themselves to the object of application (Merritt, 2008).

LED´s are light emitting diodes, which are different to conventional halogen or neon lightbulbs in terms of efficiency and costs (Cathcart, 2007). These technological aspects and the current status quo of Lumalive will be discussed in section 3.2.1.
Royal Philips as the holder of the patent is also getting mentioned in the consecutive section. It is getting mentioned due to the research and development processes, which led to the patent of Lumalive. Furthermore, information about the company Royal

Philips will be discussed in order to elaborate on its market influence in the field of consumer electronics. The technology of Lumalive had its first market entry in 2007/08, but failed to persist. The reasons for Lumalive´s market failure will be discussed in section 3.1.3. These insights are important for this bachelor thesis in order to define the requirements that need to be optimised for a market re-entry.

3.1.1 Philips Lighting

Philips Lighting belongs to Royal Philips, which is the world's largest company producing artificial light. Royal Philips is divided into the fields of healthcare technology and lighting technology for the consumer electronics market (v. Os, 2016). Worldwide Royal Philips employs 50,000 people. Eight billion Euros are generated annually through sales, by the company sector of Philips Lighting. Of these eight billion Euros, five percent are getting reinvested for research and development purposes (v. Os, 2016). Famous patented inventions that come from Royal Philips are for example CD Players, Cassette recorders and the X-ray technology (v. Os, 2016). All of the previous stated inventions have changed circumjacent industries in an incremental dimension.

In the field of lighting Philips remained the market leader in LED devices and connected LED systems and services. As the leading lighting company, Philips tried to stay ahead of competition and started these kind of projects very early. When it comes to the rivalry about patents, Philips always tries to take the first mover position. In the interview with Koen van Os he states, that everybody who is working with LEDs at the moment, has a licensing contract with Philips (v. Os, 2016). The concept of licensing allowed Philips Lighting the outsourced the production of LEDs. Van Os argued that the licensing of patents is more lucrative than the in-house production of electronics. Philips moved away from the component production and is focussing on the application of LEDs inside other materials (v. Os, 2016). The concept of outsourcing also enables Philips to restructure and focus resources in the fields of research and development. The slogan of Philips Lighting, "Taking light beyond illumination", exactly describes the companies vision of exploring light-applications in other industries, said van Os in the interview (v. Os, 2016). As it was mentioned earlier, Philips Lighting is mostly active in the fields of lighting systems and services. The following image gives an overview over the different markets of lighting applications can be seen and it shows the diverse market proposition of Philips Lighting.

Figure 1: Diversification of Philips service offers. v.Os, 2016.

The establishment and controlling of illuminating systems are especially done for governments when it comes to controlling city lightning stations and street lights. Furthermore, Philips Lighting is controlling the illumination of sport stadiums, offices and industrial plants. Van Os says, that this connectivity is a step towards the development of the so called smart cities (v. Os, 2016).

Philips is not only providing systems and services to industries, but also to private households. Currently, Philips is working on an important project called PhilipsHue, which is concerned with the production of a light bulb that fits into any normal socked and with interchangeable wavelengths (colours). The PhilipsHue uses the Zigbee system, a high-level communication protocol, to create personal networks and it is also remote controllable (v. Os, 2016). This allows to decorate rooms with a customised mood atmosphere. Some characteristics of this PhilipsHue technology can also be found in the programmable fabric Lumalive which was treated as a scientific breakthrough. The technological characteristics will be listed in the following section.

Another important department, is the implementation of LEDs into other materials. Philips lighting tries to move away from ridged applications and instead they focus on moving towards flexible and conformable materials. The graph on the next page shows which stages of LED implementation are on the agenda of Philips Lighting.

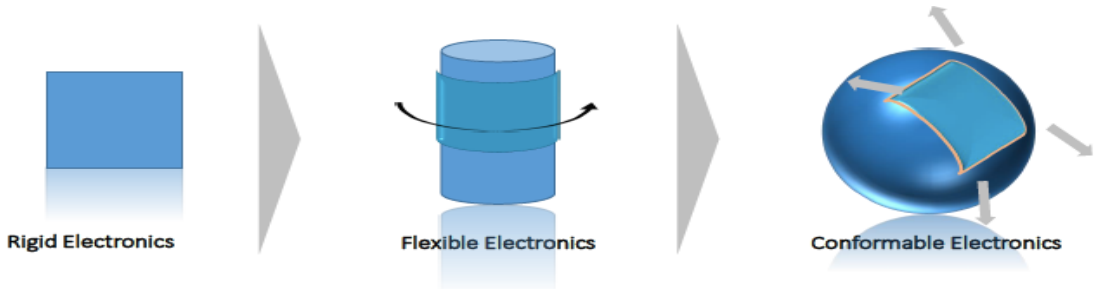

Figure 2: Stages of implementation. v. Os, 2016.

The implementation of light bulbs into rigid materials already gained momentum in the early stages when LEDs were invented. An example for this is the implementation into light switches as an indicator lamp. Implementing light into flexible objects is also realisable, which can be seen in LED strips that are used for decorating purposes. The main challenge is to incorporate the technology of LEDs into materials, which are conformable such as textile cloth or plastic foil. As a first mover in the market, Philips Medical Healthcare managed to incorporate LEDs into textile in a primitive way. They developed a medical device that can be worn and that emits blue light. This device has the ability to cure muscle pain and back problems. It was found out that the chemical effect of blue light on the skin increases the blood flow and therefore illnesses can be cured faster. With an affordable market price of 150 € for the 10x10 cm Patch, Philips Medical Healthcare produced the first light emitting textile for the consumer (v. Os, 2016). Due to this invention, the textile industry showed great interest in LEDs being integrated into fabric.

An industry that is currently not supplied by Philips, is the advertising industry. For this dissertation, this niche is seen as a possibility to diversify the market performance of Philips Lighting. The research shall elaborate, whether the possibility of a market expansion into the advertising sector could be achieved with the market re-entry of Lumalive.

3.1.2 Technical Characteristics of Lumalive

When Koen van Os started at Philips in the year 2000 he worked in the field of micro assembling of hard-core electronics. The innovative concept of LEDs is an example of hard-core electronics. The difference between hard-core electronics and soft-core is the substance inside the light bulb which gets electrified. Soft-core bulbs are based on gas that gets ignited, like halogen light bulbs and neon light bulbs. Hard-core bulbs have an integrated crystal which gets electrified (v. Os, 2016).

During the past ten years, rapid changes in the lighting industry occurred with regards to the efficiency of light bulbs. With the transition of ionised gas lightening that needs ignition to solid lightening, in which the light comes from a solid material, efficiency measures have also changed. The efficiency is graded by allocating the generated intensity of light (Lumen), to the required amount of electricity (Watt). Conventional Osram light bulbs have an energy efficiency of five to ten percent but are outperformed by LEDs that have an energy efficiency of up to fifty percent. This means that the light intensity has increased from ten Lumen per Watt to more than 200 Lumen per Watt (v. Os, 2016). The invention of LEDs also changed the way how light sources can be handled. Because of its assembling and size, light bulbs turned from fragile to unbreakable. Furthermore, the increased energy efficiency, led to a decrease in heat development so the light source can be touched. LED´s were invented in the 1960´s but were only used for indication lights and not for lightening purposes. LED lightbulbs started to get used as a lighting source at the beginning of the 21st century (v. Os, 2016). Lumalive was developed based on the wearable light emitting panel that was invented by Philips Medical Healthcare, mentioned in the previous section. According to Koen van Os, Lumalive is made of a polyester fabric which is interlinked with light emitting diodes. These diodes are assembled in a dot matrix, which guarantees the equal distance between the diodes. Due to the state of technology in 2005, the distance between these diodes measured three centimetres (v. Os, 2016). Static LED screens that are currently being used for advertising billboards have a high density of 4mm/LED. Van Os argues, that from a current research perspective this would also be achievable on flexible materials (v. Os, 2016). As it will be mentioned in the qualitative analysis, one can say, that the resolution of a displayed image is dependent on the number of diodes per square centimetre. An increase in the number of diodes per square centimetre would also increase the resolution of an image. The picture below shows a panel of Lumalive fabric in its unprocessed form.

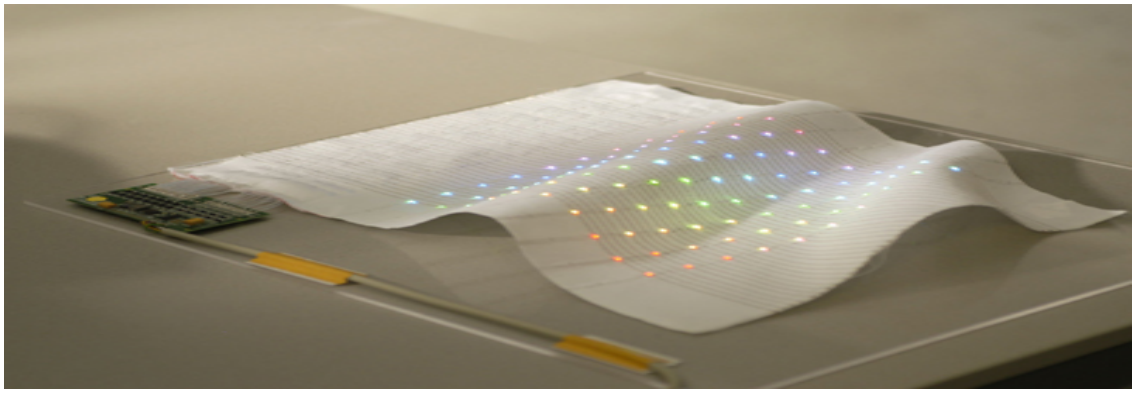

Figure 3: Lumalive fabric, Merritt, R. (2008).

The distance between the individual diodes is necessary to allow flexibility of the fabric. In the left edge of figure 3, the motherboard which decodes electric impulses can be seen. It is responsible for sending messages, to each of the diodes. With regards to the terminology, messages are seen as visual content like pictures, texts, signs, animations and moving content on the fabric (v. Os, 2016). These messages can be stored on a memory device that is integrated in the motherboard, which allows portability.

Another way to deliver the messages to the motherboard is possible with a connection to a static computer or a web-hosting station, for example a Wi-Fi router (v. Os, 2016).

The power supply can be managed with a portable battery solution or a local power supply. Due to the cost efficiency of LEDs, investments into a product like Lumalive are seen to be lucrative in the long-term. The long-term cost cutting efficiencies of LEDs can be seen in table two, in which compares LEDs to a conventional incandescent.

	Incandescent	**LED**
Approximate cost per bulb	$1	$5-8
Avarage lifespan	1.200 hours	25.000 hours
Watts used	60 W	10 W
No. of bulbs needed for 25000 hours of use	21	1
Total purchase price of bulbs over 23 years	$ 21	$ 8
Total cost of electricity used (25000 hours at $0.12 per kWh)	$ 180	$ 30
Total operational cost over 23 years	$ 201	$ 38

Table 2: Incandescent vs. LED. Johnson, 2015.

Table two, that is provided above, shows, that a LED is five times cheaper compared to a conventional incandescent, over a time period of 23 years. Thus it can be concluded, that the technology of LEDs compared to conventional light bulbs, is superior with regards to the lighting efficiency (Lumen/Watt) and operational costs.

Philips managed to assemble LEDs in a way that allows it to be integrated into any kind of conventional utilization of textile fabricates. They were able to integrate Lumalive Fabric into t-shirts which were used for promotional purposes. This shows, that even in the form of a t-shirt, Lumalive is able to display very dynamic videos on its surface. Further details about the promotional uses of Lumalive are listed in the consecutive section.

At the time of invention, in 2007, the market price for such a t-shirt was 2.000 Euros. Van Os is estimates, that the revival of production would lower the production costs by 90 percent, compared to the one in 2007. Hence, the market price per square metre used in a t-shirt is estimated to be 100 Euros (v. Os, 2016).
He also states that it is possible to produce coils of metres of this Lumalive fabric. As previously mentioned, Philips would not manufacture Lumalive on such a scale but would outsource the production to various European projects that have this aim (v. Os, 2016). An example of the outsourced production of Lumalive on a mass production level, is the production of a large luminous surface. This surface comes in the form of a panel and is produced by the Kvadrat company. These panels measure up to three square metres and are currently being used for illumination purposes in different environments such as offices, hotels, lobbies, malls and hospitals. This serves the purpose of mood management (Koninklijke Philips N.V., n.d.).

3.1.3 Exploitation of Lumalive Fabric

Due to Lumalive´s characteristics as a display surface, people started renting services that supplied the technology of Lumalive fabric. Although, that the purchasing costs used to be expensive, the renting business to artists and roadshows was profitable (v. Os, 2016)

One way of commercial exploitation with Lumalive was the promotional renting service to roadshows and expositions. With the integration into t-shirts, Lumalive served as a display surface, which was programmed to show different images. Interconnected with the technology of Bluetooth, the individual t-shirts were capable of interacting with each other (v. Os, 2016). This served the purpose of raising awareness for the stand at the exhibition. An example can be seen in figure four.

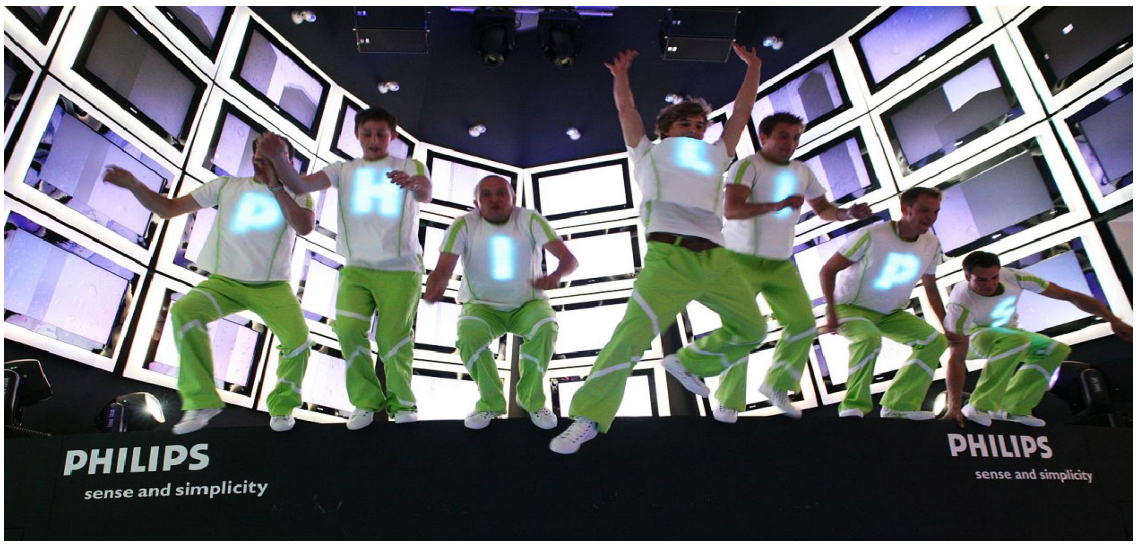

Figure 4: Example of Lumalive implementation into t-shirts.Yam, 2007.

Because Philips´ main clients were from the car industry, van Os said that this was a major factor why the technology couldn't sustain in this market as the car industry was heavily affected by the global economic crisis. This crisis led to a total sales decrease of 5.1 % in the automotive industry and subsequently a decrease in marketing budgets and thus Philips sales declined (Wad, 2009).

Van Os also mentioned the example of the entertainment industry that was interested in the Lumalive technology. Artist showed interest in the application of Lumalive within costumes and stage choreographies. Popstars equipped with the Lumalive fabric were Micheal Jackson, Gorge Micheal, the Black Eyed Peace and DJ Hardwell.

Hence, it can be said that the introduction of this new LED technology was embraced by the target group `artists`. Although Lumalive fabric got purchased by a few individuals, the number of items sold, did not compensate the research and development

costs (v. Os, 2016). Thus it can be concluded, that the wrong people have been targeted during the first trial of the market entry.

Another industry, which tried to make a use out of Lumalive, was the fashion industry. One attempt aimed at putting the lightening aspect into protection clothes. Labour clothing brands such as Strauß would have an additional unique selling point (USP). The LED Fabric could have served as a warning instrument that communicates signs or symbols. On a construction site, the protective LED clothing could screen road signs which would otherwise be shown on static pillars. To Lumalive´s disadvantage, this idea got pushed aside by the fashion industry, because members of this industry felt, that the fashion aspect would get lost (v. Os, 2016).

Another barrier of entry is the aspect of fashion seasonality. The fashion industry experiences different trends from season to season during which they are developing new styles. The development of new styles demands a readjustment of the LED technology each season. Different colours and different sizes require new applications of semiconductors and LED arrangements. This means, that highly expensive Lumalive technology would get thrown away or subsidised after a couple of month or years.

Furthermore, the technological and the fashion aspects speak a complete different language in terms of processing steps. The fashion industry relies on production steps that reach from threats, to fabric, to cutting, to painting, to tailoring and the sale via multiple sales person. The production steps of Lumalive, on the opposite, only include the aligning of LEDs on the desired fabric (v. Os, 2016). It can be assumed that the existing fashion industry market need to be adjusted towards simpler production steps in order to allow a possible market re-entry into the business to consumer (B2C) business.

Hence, it can be said, that there is still a big issue with fashion industry as a possible target market. Nevertheless, there is a general interest into the role to role Lumalive technology from the fashion industry, but Philips doesn’t see that much potential from the B2C market (v. Os, 2016).

3.2 Advertising in a Public Limited Environment

With regards to the paper, the public environment will be treated as the point of implementation for Lumalive. The possible implementation would occur in the public limited environment. For this dissertation, the public limited environment (PLE) is defined as locations, which are publicly accessible in exchange of an entry fee. From that perspective, examples for a public limited environment are restaurants, theatres, sport stadiums, festivals, and other. With regards to media, PLEs are a subcategory of

out-of-home environments. The characteristic of the public accessibility became a valuable factor for advertisers.

The environments that were mentioned previously, attract specific groups of people. One can say, that stadiums are attraction poles for people with sport interests, museums for people with specific cultural interests and restaurants is an attraction pole for people with certain culinary desires. Marketers have recognised these target behaviours within the public limited environments and declared them as being suitable for media planning. In this paper, the example of Vapiano will be used as a main example of a public limited environment. An interview with an employee at Vapiano provided insights about Vapianos advertising measures. How this insight contributes to the implementation strategy into the OOH market, will be discussed in section 3.2.3.

According to the data collection company Nielsen, out-of-home advertisement generated 1,7 billion Euros turnover in 2015. OOH advertising budgets make up 5,9 percent of the whole media budget that gets invested in the German media market. With regards to turnover numbers out-of-home advertisement has overtaken radio advertisement (Ansorge, 2016).

Due to the rejuvenation of target groups, the OOH media budgets have increased over the past years. Young target groups can be reached during the whole day on the streets, thus multiple connection hubs can be established with the target group. (Zayer, 2016). A term that is commonly used in connection with this rejuvenation is the mobile target groups. For this bachelor thesis, the development in the OOH market is treated as an opportunity for new entrants who target young and mobile people. Companies that want to advertise products or services, as well as technology companies that develop hardware that enables the communication, want to participate in this developing market. The approach of this paper aims at pushing the technology of Lumalive into the out-of-home advertising market in order to generate benefits for advertisers and media space owners.

3.2.1 Status Quo of OOH

As mentioned earlier in the paper, out-of-home advertising is treated as the overall term for communicational tools in the public environment that are used for product marketing.

Because OOH-advertisement is present throughout every season and every time of the day, it has the advantage to achieve high coverage and high contact repetition. OOH allows a geographical segmentation. Especially the mobile population is targeted

efficiently when the geographical place of advertising is chosen wisely (Schweiger & Schrattenecker, 2009). The effective positioning of advertising is done by media agencies that are specialised in OOH marketing. One of these specialised agencies is Jost von Brandis. Their profession lies in the establishment of media plans and the purchase of the appropriate ad spaces. The ad spaces are provided by publishing houses who own a mix of different advertising spaces. Similar to newspaper publishing houses OOH publishers offer a wide range of formats in which advertisements can be placed. These formats differ in size and location of placement. The big publishing houses in the field of OOH advertising are Stroer, WallDecaux and AWK (Zayer, 2016). Together they administer a large percentage of the 140,000 digital screens in Germany. Digital screens and other types of advertising tools in the out-of-home market are listed in the following section.

In the interview with Jost v. Brandis it was found, that advertisers of fast moving consumer goods (FMCG) are using OOH advertising more than service providers. This is due to wider target groups that are potential clients (Zayer, 2016).

At the moment tabaco and beverage companies are investing the most money into OOH campaigns. Restrictions in the television and radio landscape are forcing the tabaco and liquor companies to advertise in other media which have a similar level of coverage. To guarantee a high level of coverage, the publishers are investing in the development of new tools that can display ad spaces.

Figure 5: DOOH screen at a bus stop. digitalavmagazine, 2015.

Nevertheless, DOOH is not a standardised advertising tool for those who do outdoor marketing. In an interview published in the Horizont, Jochen C. Gutzeit, the Managing Director of the trade association for OOH advertisement talked about the current status

of DOOH. He said that Germany has an established digital infrastructure when it comes to public transport hubs, but not when it comes to the digital infrastructure on the streets (Ansorge, 2016). Figure 5 shows an example of a DOOH screen in the environment of public transportation. The technology of digital screens allows the screening of multiple images in a short period of time. This is a unique selling point towards traditional poster advertising. The screens can be monitored remotely and with very little workforce. The traditional job title of a poster sticker is getting substituted by people who a controlling the ad placement on the screens with computers.

Interconnectivity is another feature that is possible with DOOH. Other devices will have the opportunity to interact with the advertising screens and vice versa. In an interview published in the Horizont magazine, Evelyn Lüttgens, the general manager of the media agency Pilot states, that digital out-of-home advertising will allow a variety of communication opportunities when it connects to the online- and mobile- market (Ansorge, 2016). The approach of interconnectivity can already be seen in the field of mobile advertising on smartphones. Location based targeting enables the communication of advertisers with potential clients for example at the point of sale. In the case of indoor targeting, the "beacons technology" allows a short range communication of quick response messages. Thereby, consumers that have a customer account or that are object of a data pool can be easily targeted. For outdoor communication, "geofencing" is proven to be an effective method of targeting people in the closer environment of a point of sale. An area around the object of advertising is getting defined in which potential clients receive a message concerning the product communication (Karr, 2015). Both technological approaches aim at the increase of interconnectivity in the OOH advertising.

It can be summarised, that advertising in the public environment is focusing on digital modifications and the connectivity to other devices. The statements from influencing managers in the OOH advertising industry have clearly shown, that the digitalisation of outdoor-advertising tools is gaining momentum. Furthermore, Gutzeit mentioned, that OOH advertising should not only be present in the public transport system, but also on the streets and closer to the daily routines of people. It can be concluded, that digitalized advertising is gaining momentum in public places and it has the potential to become vital in public limited environments.

3.2.2 OOH Advertising Tools

In the previous sections, some advertising tools have been mentioned already. For the purpose of this paper, OOH advertising tools are getting defined as hardware objects that are capable of displaying a communicational message. These objects can come in any size and shape and serve as a screening surface for multiple messages.
The most prominent out-of-home advertising tools include posters in dimensions such as advertising pillars, LED screens, info-screens and banners. These media are often located in the public environment for example on the façade of a building, in streets, the public transport and also stadiums (Schweiger & Schrattenecker, 2009). Info-screens count into the category of OOH media and are good for story telling in the local traffic. They were often considered to be the first digital outdoor media (Ansorge, 2016).

Publishing houses like Stroer are calling themselves urban designers. The task of these urban designers is to implement furniture like banks in leisure areas and public toilets. Publishing houses are interested in doing so because they can repurpose this furniture for the creation of a new advertising space. Publishers are also concerned with the development of digital media tools. Therefore, they have created their own research and development departments around this urban design aspect (Zayer, 2016).
Another advertising tool that is especially getting used in public limited environment is called ambient media, which is a sub category of OOH. Every ad-space that is not connected to transport or digital advertisements can be considered ambient media (Zayer, 2016). This form of advertisement is tailored to the point of action in which the ambient tool is used. Examples of Ambient Media are beer coasters, table cloth and also advertising space at unconventional locations such as toilets fall under the terminology of ambient media (Schweiger & Schrattenecker, 2009).

With regards to the locations of implementation, Lumalive fabric has the potential to become a digital screening ad-space in the general out-of-home environment but also in the field of ambient media. The implementation approach in section 4 will focus on a lucrative niche market, which gives Lumalive could get the opportunity to become a new category of advertising media. This approach will be seen as realisable as far as the statements of each expert are recognised as a reliable source.

3.2.3 Public Limited Environment

As discussed previously in this paper, the public environment serves as the location in which out-of-home advertisements are realized. For this thesis, the public limited environment can be seen as a subcategory of the public environment. Hence, these are certain areas in the public environment that are accessible in return of an entry fee. This fee often comes in the form of a ticket. This helps the proprietor to quantify the clients, which are remaining in his public limited location. Also the targeting of people can be done better once data has been retrieved from them. Locations that are considered to be public limited environments (PLEs) are stadiums, concerts, restaurants and the public transport system.

The thesis focus to the PLE of restaurants a possible implementation, of Lumalive as an advertising medium. The famous restaurant chain Vapiano helped in retrieving information about advertising in this environment. The interview partner, who was chosen for this paper, is a member of the system-gastronomy Vapiano. Tom Lichtenstein is the operations manager of five Vapiano restaurants. As an expert he gave insights into the possible haptic and communicational implementation into restaurant locations. In the following paragraphs, the characteristics of the environment of Vapiano as a lucrative hub for advertisers, will be elaborated.

In order to become an interesting advertising space on which advertisers are willing to pay money for, the ad-space needs to generate high measures of reach. This is achieved, as soon as a targeted audience notices an advertisement. Zayer mentioned, that a new advertising tool must be implemented in an appreciable number of outlets, in order to establish a strong network with wide reach measures (Zayer, 2016).

With regards to the people that can be targeted, Vapianos´ restaurant network delivers a large number of consumers to potential advertisers. Lichtenstein says, that in average 800 clients are served each day in every location. The months of March to October make up the season in which our customers like to sit outside, says Lichtenstein. This number varies between 150 and 250 people (Lichtenstein, 2016). The terraces of Vapiano are located in front of the entrance of each restaurant. This ensures, that each customer has to pass the terrace area, whether he/she is sitting outside or not. This will be favourable to the thesis, due to the installation of ad-spaces in the outdoor environment. In the case of a successful installation of Lumalive, the number of customers in a restaurant serves as a real number of people that can be targeted. It can be assumed, that the public limited environment of the system-gastronomy Vapiano provides a target audience of 120000 people per day in all restaurants.

The installation of a new screening surface would therefore occur in an established franchise network that reaches a high number of customers per day.

An example that was given by Claudia Zayer confirms this implementation approach of advertising into the PLE. The Deutsche Bahn is an established network in the field of passenger transportation. The company possess trains as well as train stations in which the DB is displaying information about their services. With the access to a high number of people and also customer data, the transport undertaking founded an own media agency called Media und Buch GmbH (Zayer, 2016). This agency is now responsible for the media controlling of ad-spaces inside of the Deutsche Bahn network. Brochures, billboards, info-screens and other media, which the DB uses to communicate to their clients, also serve as ad spaces for advertisers. By the partial conversion of their existing communicational tools into advertising spaces, the Deutsche Bahn has established an attractive network of ad-spacesfor advertisers. For the purpose of this thesis, the mentioned public limited environment serves an example which uses its contact to a broad target audience for advertising purposes.

3.3 Comparative Analysis

For the comparative analysis, the characteristics of Lumalive will be compared to similar screening surfaces in the field of OOH advertising. Therefore, printed ad spaces will be analysed with regards to the production cost per square metre and also the performance of such ad spaces. The comparison of these two factors will show if Lumalive has the capabilities to outperform traditional ad spaces. In order to create a valid comparison, the measures of one square metre of the two advertising tools, printed screening surface and LED screening surface were compared. The Lumalive data for this comparison was retrieved from the interview with Koen van Os and the data of printed screening surfaces got retrieved from suppliers who are producing advertising tools such as posters and banners. When the production costs of Lumalive are lower than the costs of printed ad-spaces, this will be seen a positive comparison result for this paper. The same principle accounts for the quality comparison. Prominent quality factors that will be compared are the resolution and the durability of materials. A comparison will be reviled as pro-Lumalive, as soon as, the comparison results in an equivalent amount of quality factors as well as well as a surplus of quality factors for Lumalive. The positive result of this comparison will foster an implementation approach with regards to the practical application as a substitute for traditional screening surfaces.

3.3.1 Comparison of Cost Factors

The costs of Lumalive were retrieved from the interview with Koen van Os who is a senior scientist at Philips Lighting and also the developer of the Lumalive technology. Van Os also developed the production processes that were used for the production of the Lumalive textile. He states, that the production costs per square metre totalized in 2000 Euros during the times of Lumalive´s invention in 2007. This was due to the research and development processes, which have not been established at this time. He adds, that the production costs have gone down by a factor of twenty, from a current research perspective. This is due to established production processes (v. Os, 2016). One can assume, that within ten years, the market price for a square metre of Lumalive textile decreased from 2000 to 100 euros. The technology of Lumalive was compared with printed screening surfaces from five different suppliers. These suppliers are Vispronet, Diedruckdienstleister, Display-Max, Werbebanner24 and Bannerheld. The suppliers that were taken for the comparison approach offer the imprinting of merchandise and advertising tools. Each of the five suppliers are able to imprint textile products such as banners, flags, tends and parasols. For an unbiased comparison, the cost of one square metre of imprinted poly fibre canvas is taken as a comparable standard. Figure 6 below shows the comparison of the different prices offered by the six suppliers.

Figure 6: Cost comparison between printed Banners and Lumalive textile. Source: Own Graphic - Vispronet, 2016; DieDruckdienstleister, 2016; Display-max, 2016; Werbebanner24, 2016; Bannerheld, 2016.

As seen in figure 6 above, the prices of the different suppliers vary, in which Display-max offers the cheapest price of 29,75 Euros and Bannerheld offers the highest price of

57,00 Euros. Although the prices of each supplier differ, it is assumed, that the average market price per imprinted square metre accounts for 46,00 Euros. Thus, the material of Lumalive is more than twice as expensive as imprinted poly fibre canvas.
In the usage as a screening surface, imprints cannot be reversed because the ink is getting soaked up by the poly fibre. This implements that an imprinted screening surface such as an advertising banner can only be used once for a single image. In contrary, the Lumalive textile can be reprogrammed infinite times, which allows to display multiple pictures after another. One can say, that Lumalive could outperform imprinted banners in terms of costs, once more than two pictures are getting displayed on the same piece of Lumalive textile. As soon as more than two pictures are displayed on Lumalive it becomes more cost-efficient than a printed poly fibre canvas under the average market conditions. It is assumed that the purchase of Lumalive textile becomes cost effective in the long run, when it is used frequently as a display surface.
The relation of Lumalive´s purchasing costs and the media costs will be elaborated in detail in chapter 4.2. This section will show, that the multiple usage of each media has a significant effect on the cost efficiency of Lumalive towards printed advertising tools.

3.3.2 Comparison of Quality Factors

Similar to the information on cost, facts about Lumalive´s quality factors were retrieved from its developer Koen van Os. During the interview, van Os also described the qualitative characteristics of Lumalive as a screening surface. In the following comparison, factors such as the durability and resolution are listed and analysed.
With regards to the durability, Lumalive features a LED structure that is capable of lasting more than 30 years with little maintenance (Cathcart, 2007). For the research of this paper, the lifespan of an advertising banner has been identified by researching the homepages of the five suppliers mentioned in figure 6. All the suppliers guarantee a lifespan of up to five years for an imprinted banner. This has also been stated on the website of werbebanner.com, where they added, that the lifespan of the banner material depends on the conditions under which it is operated.

The maintenance of Lumalive is essential for guaranteeing a non-polluted screening surface. This is not the case for imprinted screening surfaces because these are not meant to last as long as the electronic textile. The characteristic of being water durable, is in favour of Lumalive, hence it enables the washability after messy weather conditions or air pollution (v. Os, 2016). It also accounts for traditional imprinted

banners. The printing process onto poly fibre textile allows wash ability, which helps sustaining a clear image on such a screening surface (werbebanner.com, n.d.). Another quality characteristic of printed and digital screening surfaces, is the ability to feature images on both materials. In the case of imprinted materials such as the poly fibre of traditional banner advertising, an external light source is needed to display the content. This external light source comes in the form of daylight or artificial lighting, for example street lights or shop window lighting in urban areas. This characteristic leads to a limited usability of the screening surface. Additionally, the Horizont adds, that a non-illuminated advertising surface (poster, billboard) is less efficient during winter seasons and functions better during summer seasons (Ansorge, 2016). This feature is classified as a disadvantage towards Lumalive. The Lumalive technology has the competitive advantage of providing an ad-space that is illuminated without external lighting sources. Thus, it is not depended on light enriched seasons or the external light source of urban illumination. The technology of light emitting textile would be capable of displaying communicative messages during twenty-four hours on each day throughout the year as long as the power supply is assured.

As a third quality aspect, the type of content that can get displayed on the two materials, is taken into account. An imprinted advertising tool is capable of carrying one irreversible steady content. Hereby, the content comes in the form of a picture, a text-phrase or a combination of both. In the case of Lumalive, the type of content is limited to the storage capabilities of the motherboard. Van Os states, that the LED structure is able to visualize pictures, moving images, animations and also movies (v. Os, 2016). This can also be seen in a YouTube video that was published in connection with a technology exhibition (Toptierfilms, 2011).

For the comparison of quality factors, the aspects of visualization have now been analysed with regards to the substance of communication. Another aspect is the generation of a clear picture with the material used. One technological criteria that is enabling the decoding of communicational messages, is the resolution of the displayed content. In accordance to the Oxford dictionary, resolution is defined as the degree of detail visible in a photographic or television image (Oxford University Press, n.d.). The resolution of an image is indicated by the dots per inch (DPI). For an image, this means, the number of dots in a square inch that are printable. A higher number of dots per inch,

result in a better resolution (Print Factory, n.d.). As already mentioned in section 3.1, Lumalive had a resolution of one LED every three centimetre, in 2007. Over the past years, the technological progress allowed the resolution of Lumalive to improve. Nevertheless, Koen van Os always called the technology of Lumalive a low resolution display, because they tried to stay away from the display technology production (v. Os, 2016). Nonetheless, the paper examines the light emitting textile as such, because of the added value it could deliver to the advertising industry. However, according to Claudia Zayer this quality standard for Lumalive is the market standard for LED screens, which is a high definition (HD) resolution (Zayer, 2016). In 2007, Lumalive was not displaying a HD resolution. Nevertheless, van Os clearly points out that from a current research perspective, the standard of HD is achievable with the Lumalive textile. However, this would require a higher density of light emitting diodes per square inch.

In summary, the qualitative comparison results in a competitive advantage for the screening surface of Lumalive. The LED technology shows a durability that outperforms imprinted banners which suffer from weathering and last approximately 25 years less than Lumalive. Furthermore, the light emitting textile allows advertising messages to be seen, throughout all seasons and without any external light source. Together with the technological advantage of displaying moving pictures on the surface, these two characteristics of LEDs can be seen as the unique selling proposition of Lumalive. One aspect in which the imprinted advertising banner achieves better quality results than Lumalive does, is the resolution of the image that is displayed. In accordance to the developing scientist, this issue of resolution could get solved from a current research status, by which a high definition standard could be achieved. Therefore, one can conclude, that the LED textile could outperform imprinted OOH media tools such as an advertising banner, in terms of quality.

3.3.3 Summary of Compared Parameters

In the previous sections 3.3.1 and 3.3.2, two screening surfaces were compared with regards to their production-costs and quality attributes. Through this comparison, the potential of Lumalive as a subsidiary good for conventional imprinted materials was evaluated. The outcome of the comparative analysis resulted in a competitive advantage for Lumalive. Hereby, the light emitting textile outperforms an imprinted advertising canvas in terms of costs and quality. The LED technology allows the screening of multiple pictures, without exchanging the material. Thus, the Lumalive´s cost efficiency is superior to imprinted material once it is used for more than two different images.

Also in terms of durability, the LED technology of Lumalive shows a 25 year longer lifespan than traditional OOH banners. Additionally, the screening of images via LEDs ensures the textile to be independent from external lighting. With regards to the resolution, improvement needs to be done with the DPI, so that a clear picture can be assured.

For the purpose of this theses, it can be concluded, that the Lumalive textile shows similar and also better characteristics as traditional OOH media. In the following chapter, these advantages will base the argument for the implementation approach that could enable a market re-entry as a tool for outdoor advertisement.

4 Implementation

In the following section, the data obtained in the previous sections will be applied to the implementation approach. In this theoretical approach, Lumalive as a screening surface for advertisements, will be installed into the public limited environment of restaurants. This implementation will be executed in a subjunctive approach. This is due to the sources, which were used to establish this approach. Although the interviewees are all experts in their field of profession, the statements of each interviewee were not affirmed by more experts of the same sector.

From the comparative analysis it can be concluded, that Lumalive is capable to substitute conventional imprinted screening surfaces. Thus, the haptic implementation into another textile fabricate, is realisable. The haptic implementation in this chapter will focus on the installation of Lumalive into furniture and their appearance in the gastronomy sector.

In section 4.2, the different stakeholders, which are needed for a market entry, are listed. That section also explains the contributions of each stakeholder. Furthermore, the contractual implementation will show, how the screening surface can be monitored in a restaurant and the content management of the advertisement will be discussed.

The last step that has to be considered in the installation, is the communicative implementation It analyses the causes and effects which Lumalive can have on the public limited environment and also on the advertisers. Therefore, the internal and external communicative value that Lumalive could have on its stakeholders, will be discussed

4.1 Haptic Implementation

In the interview that was conducted with the senior scientist of Philips Lighting it was stated, that the technology of Lumalive allows the implementation into poly fibre textile fabricates. Therefore, the procedure of adapting the Lumalive technology on to furniture, contributes heavily to the market entry approach for this thesis.
Furniture that allows the installation of Lumalive would have to be made out of a textile fabricate. Furthermore, the furniture would need to have a use of application in an environment, in which masses of people can be reached. When taking those two factors

into account, the thesis aims at parasols in gastronomy environment's, for the haptic implementation approach.

The research for this paper found, that gastronomies are often tied to beverage contracts of lease in which they are being provided with equipment and merchandise products by the beverage supplier (Zayer, 2016). Thus, often only one brand is getting advertised in a restaurant. Lumalive on the other hand, could provide freedom to the owner of a restaurant, as multiple brands can be advertised in a restaurant.

Although Lumalive could offer the possibility to display any kind of advertisement, the ad should be of relevance to the target audience. Publishers should privilege advertisers at the point of sale (POS) ad-space who have a connection to the respecting POS (Zayer, 2016).

In the recent years, advertisers have recognised the potential of parasols as an ad-space which they can imprint with communicative messages. Parasols are generally used in outdoor areas to protect a person from rain and sun. Parasols are also taken as an object for implementation in this thesis, because its surface material is made of the same poly fibre like ad-banners. This type of furniture already experienced usage as an advertising tool. Therefore, an exchange of the surface material is not a major disruption to the functionality of the parasol.

Figure 7: Parasols in a pedastrian zone. AM-sonnenschirme, n.d..

As it can be seen in the picture above, parasols are covering large areas of outdoor environments. When covered with Lumalive textile, the individual parasols create communicative hubs, that can display different advertising messages. Like it was mentioned in section 3.1, the LED fabric allows the connectivity to a broad band connection such as the Internet. This property could be used to create a single control point that monitors the content in other rooms of a house, or on terraces like it is mentioned in the following (Albarran, 2009). The interconnected screening surfaces implemented in parasols would communicate with each other similar to the example of

Lumalive t-shirts, as mentioned in 3.1.3. This provides freedom to creative departments, that could use these networking parasols for creating animated ads. In addition, the broadband connection of Lumalive could allow interactions with other portable devices. Although, wireless reception devices are easy to handle for consumers, they also represent another challenge for existing marketers, that are trying to capture and hold an audience (Albarran, 2009). The innovative technology of Lumalive could provide an opportunity for marketer, which they can use for multiple forms of communication when addressing their target groups.

Another feature that needs to be considered in the implementation approach, is the interaction with the target group. The measurability of this interaction is key to a digitalized screening surface and also to the advertiser who needs quantifiable data to target potential clients. This quantification is enabled by Infrared cameras, which were developed to register eye-movement. They send out infrared light rays on to the retina of the viewing person which are then reflected in an angle to the camera. This is called Cornea-Reflex-Method. In the case of an eye movement, the entrance angle will change and is getting registered (Schweiger & Schrattenecker, 2009). One can say, that this registration of eye-movement tells the owner of screening surface, how many people are watching the advertisement. This number reveals either a high or a low measure of reach. According to Claudia Zayer from Jost von Brandis, “Lumalive parasols” have to be implemented in a considerable number of outlets in order to create a network with wide reach (Zayer, 2016). With the installation of an eye-movement registration-camera, the reach of Lumalive parasols would be traceable and the results would be measurable.

This approach of a haptic implementation into a parasol, could fulfil the criteria of being an attractive advertising space. Furthermore, it also manifests the digitalisation of an out-of-home media tool by becoming quantifiable. The generation of environmental data with motion cameras provides target group information to advertisers, which can then be processed for media planning purposes. This process will experience further elaboration in the consecutive section.

4.2 Contractual Implementation

The topic of contractual implementation discusses the different stakeholders that are needed for a possible market entry. Also the contributions that each stakeholder has to make for the implementation, will be outlined in this section. Furthermore, the contractual implementation will show, how the screening surface in a restaurant can be

monitored. This section discusses the topic of content management, that has to take place with advertisements. Therefore, the tasks of a media agency are listed, which are needed for a successful product communication on the screening surface of parasols.

4.2.1 Supply Chain Components

With regards to the components that are necessary for a successful installation, two have already been mentioned. Philips Lighting, the owner of the Lumalive patent, is seen as the supplier of the textile. In the following graphic, the supply chain is getting visualised by showing all the stakeholders and their added value from the market entry approach of Lumalive.

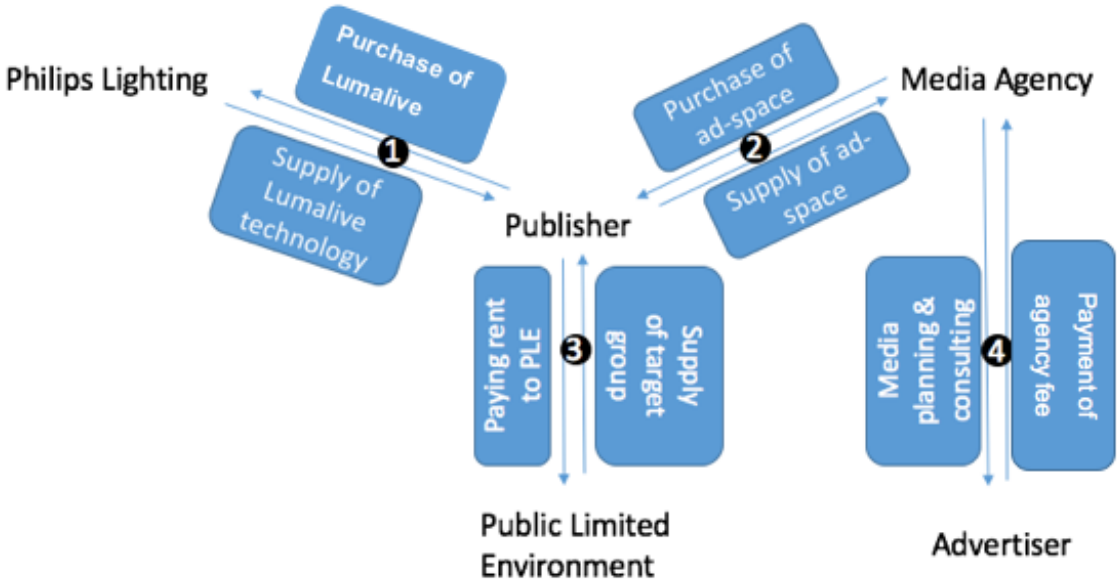

Figure 8: Relationships between the stakeholders of the implementation approach. Own Graphic, 2016.

Figure eight visualises the contribution of each stakeholder and also the role of Philips in step one of figure eight. The other stakeholder that is mentioned, is the gastronomy sector into which the new technology would be incorporated as an advertising space. Additionally, the publishers are needed to process this textile. Section 3.2.2 explained the role of publishers as urban designers, who have research laboratories in which they design new OOH tools. Therefore, existing structures could be used for the development of "Lumalive parasols". A finished Lumalive furniture could then be impeded into outdoor areas. Publishers like Stroer and WallDecaux are renting square metres of property, for the installation of a new media tool. In return, the owner of the property is getting payed (Zayer, 2016).

Usually, the owner of property where publishers want to establish their media, is the local government. One example of attractive properties are pavements, because of a high number of people that can be reached on these locations. Another popular property owner is the public transport system. Product communication can reach hundreds of people at highly commuted areas like train-stations. These lucrative areas are rented to publishers, so that they can be equipped with media tools like billboards or advertising pillars. By doing so, publishers are creating advertising space, that can be sold to advertisers. Claudia Zayer says, that it is also possible for a private person to rent his/her property (garden, house wall) to advertisers, who pay for placing their advertisement in exchange for a highly frequented location (Zayer, 2016).

With the digitalisation of media tools, media planners will even have the chance to target people location based. This can also be seen as a reason why many advertisers are increasingly moving money into digital media from traditional media (Albarran, 2009).

With regards to the example of restaurants, the terrace areas serve as the property that could be rented to publishers. System-gastronomies like Vapiano have the capacity to serve 800 people per day. Those 800 people could become potential target groups as soon as an advertising tool, like the parasol, gets installed. This step is visualised in step number three in figure eight.

This business model of selling advertisers access to audiences continues to sustain the electronic media industries (Albarran, 2009). Due to the fact, that most of the marketing managers have difficulties when it comes to media terminologies, media agencies are hired to control the media traffic for the advertiser (Farris et al, 2007). As already outlined in chapter 2.3, their task is to select suitable ad-spaces at frequented locations. This is done by creating a media plan. When this media plan is put into action, the media agency pays money to the publisher for displaying the advertisement of the advertiser, as it is shown in step two. In step three, this money will then be used by the publisher to pay a rent to the owner of the property. During this process, media terminologies and concepts are helpful in the contact with media-agencies and publishers (Farris et al, 2007) In doing so, it can be said, that the media agency functions as a media consultant during these processes. This is getting visualised in step four in the previous graphic. It can be concluded, that the presence of a media agency is necessary for the advertiser. By outsourcing the media monetisation, the advertiser can focus on its core-business.

In summary, four major components were listed, which are necessary to generate a chain of contributions. This chain of contributions is generating a value to each stakeholder of the implementation approach. With regards to the potential market entry of Lumalive, these stakeholders would need to be addressed within the advertising industry.

4.2.2 Media Content Management

In contrast to advertising in online environments, OOH advertisers cannot access user data to optimise a campaigns targeting. Thus, statistics and surveys need to be used for an approximate targeting (Zayer, 2016). A digitalisation of OOH media allows the acute targeting of people, by lining targeting data into the media tool. Institutes such as Postar in Great Britain or Stroer in Germany are trying to quantify OOH activity by making it more granular. One way to achieve this, is to conduct traffic calculations in order to determine a locations quality (Schweiger & Schrattenecker, 2009). Other targeting data can be retrieved from residential environment data providers, for example Gesellschaft für Konsumforschung (GfK) and Microm. They provide data, which show different consumer habits, traffic patterns, consumers age and the consumers gender (Zayer, 2016). Another method of data collection is very much coined to the public limited environment. It is the gathering of data via a cash register system. Specific data about the clients consuming preferences as well as an income estimation can be deducted from such systems. When taking Vapiano as an example, Lichtenstein says, that they are measuring every fifteen minutes, the turnover rates of the customers, the amount of orders and the average bill (Lichtenstein, 2016). He added the fact, that they have created bonus programs on the basis of the collected data, which are rewarding the customers. Lichtenstein is confident, that collected data can be useful when placing advertisements in and around of a restaurant (Lichtenstein, 2016).
The potential of this kind of data is also favoured by Claudia Zayer. She mentions that, POS databases allow the media planner to adjust a campaign to sales lines (Zayer, 2016). The access to this type of data is another reason, why the public limited environment was chosen for the implementation approach.

After the targeting data is retrieved, the data is compiled by media planners into a ranking lists. These lists include suitable applicant media that are put into order according to their scope of performance. With the help of ranking lists, media planners can select suitable locations for an OOH advertisement (Schweiger & Schrattenecker,

2009). One can say, that if a media tool reaches a high number of people in a restaurant, the advertising message will have a greater effectiveness. Hence the performance of this media tool will get ranked higher. High performance measures also increase the price being charged for an ad-space. This price is expressed with the abbreviation of CPM (Cost per Mil). It indicates the price that arises when contacting thousand people (Farris et al, 2007). The creation of such ranking models, could become a necessary step also for public limited environments. Each individual "Lumalive parasol" could get ranked according to their performance data in each restaurant.
In order to calculate a media tool´s performance and to justify the CPM payable, indicators are used. An indicator is a measuring system that quantifies certain trends, dynamics or characteristics (Farris et al, 2007). Every advertisement position delivers a different effect on the viewer and gains a different performance measures depending on the number of cars, trains or people passing by (Schweiger & Schrattenecker, 2009). This is why indicators are used to quantify each advertisement´s position equally.

In summary, one can say, that Lumalive as a digital out-of-home screening surface gains in attractiveness, due to the granular targeting possibilities. In the implemented form of a parasol, Lumalive could become a new advertising format that will be considered in the media planning processes of agencies. It was outlined, how existing structures of data collection could contribute to the market entry of the programmable textile.

4.3 Communicative Implementation

The following section will elaborate on the communicative effects that Lumalive could have as an advertising medium. The previous sections have analysed the attributes of the LED screening surface and concluded, that it has the potential to get used for displaying product communication. Nevertheless, the scope of application has to be discussed in order to be adopted in the gastronomy environment. One prominent obstacle for advertisement is the repelling factor of disturbance. This can occur, when advertisements are shown in the presence of interpersonal communications. In an interview published in the Horizont journal, Christof Baron, the CEO of the media agency Mindshare states that the advertising industry mustn't annoy the consumer with advertisements (Ansorge, 2016). With regards to the thesis of the paper, the communicative capabilities of a "Lumalive parasol" need to be adjusted to the environment of restaurants, in which interpersonal communication is omnipresent.

Advertisements need to be recognised in a friendly way so that it is not annoying or distracting the customers, sitting in a restaurant. Therefore, the concept of coding needs to be respected, to guarantee a good communication quality between the sender and the receiver. The sender encodes a message and sends it to the receiver via different channels. The receiver is than decoding the message (Scheier & Held, 2012). Regarding a product communication, the encoding process is done by either the sender himself, or by an agency, which is transforming the idea into concrete recognisable codes such as advertisements (Scheier & Held, 2012). The installed LED screening surface in parasols provide the opportunity to adjust advertising messages frequently, so that encoding processes can be optimised repetitively. Additionally, the client expects digital ad-spaces to show different content, compared to the static printed ad-spaces (Zayer, 2016).

This is an issue, that should also be taken into account in the communicative implementation because it would affect the example of a parasol as a display surface. Both sides of a parasol could get used as a channel of communication. Thus, the inward looking surface of a parasol could be used differently than the outward looking surface. From the interview with the operations manager of Vapiano it is assumed, that each surface side of the parasol should be used to display a different pictographic content (Lichtenstein, 2016). This statement will be discussed in the following chapter. The inward looking surface is to be seen as the internal communication and the outward looking surface as the external communication.
In the consecutive two chapters, requirements for the internal communication as well as the external communication will be summarised.

4.3.1 Internal Communication

For the purpose of this paper, the internal communication refers to the inward looking parasol surface. The internal communicative effect is of great importance, because it is an essential component of the implementation approach into the gastronomy sector. Therefore, the issue of disturbance by advertisements will be elaborated.

As already mentioned before, advertisers should try not to annoy people with product communication. When customers are sitting under the parasol, they would be exposed to the inward looking side of the parasol. In that case, a common banner advertising could be stressing to the customer, due to its eye catching characteristics. When Koen van Os was asked about the display characteristics of Lumalive, he advised, that

Lumalive would need to be unobtrusive, when it displays pictographic content (v. Os, 2016). To ensure unobtrusive advertisements on the inward looking Lumalive surface, this dissertation aims at implicit advertising. Implicit advertising relies on the appearance of a product and also on the image as well as on the brand message. This type of advertising tries to make it appear as if a product is not actually being advertised at all (Bradley, n.d.). In order to launch an implicit advertising communication, an advertiser needs to know if the target group is familiar with codes like the corporate identity of a product or symbols used in previous advertisements. Unlike traditional advertisements, which display attention grabbing messages, implicit brand communication would need to use codes that stimulate the unconscious mind of the target group.

In their book about neuromarketing, Scheier and Held refer to two types of pilots which are monitoring a person's brain. One of them is the pilot, that is conscious and explicit and concerns the scope of thinking, facts, reflection and language (Scheier & Held, 2012). The other one is the autopilot, that controls the behaviour of an individual in an implicit way. Implicit behaviour in that context means, that the brain is not deliberating about a stimulus. Instead, it is responding on this stimulus spontaneously. Actions that are monitored by the autopilot are for example memory, recognition, association, emotion and attitude (Scheier & Held, 2012). The authors Scheier and Held also provide a survey, which was conducted by the German GfK concerning this topic. In this survey, 1006 people older than 14 years of age, where shown advertisements of famous brands. Neither the brand´s name nor a product was shown in the advertisement. From then on, it was tested whether the participants could allocate the right brand to the right advertisement. The result showed that 67 percent of the participants recognised the advertisement of Becks, 70 percent for Malboro, 66 percent for Milka and 58 percent of the participant recognised the mobile-service provider O2 (Scheier & Held, 2012). It can be concluded that brands can be identified, by communicating familiar codes to a target group. This finding is a key element to the internal communication, which could be displayed on the "Lumalive parasol". The realization of such implicit advertising could fulfil a restaurant's requirements, of not disturbing an interpersonal communication.

With regards to the display characteristics of Lumalive, Lichtenstein adds, that the legal requirements of a brands corporate design would need to be fulfilable. He gives the

example of the light spectre that suits to the Coca Cola corporate design (Lichtenstein, 2016). Once the uniqueness of such corporate colours can be ensured, colours can become codes for brands (Scheier & Held, 2012). Creative designers, that specialise on large luminous surfaces are familiar with the creation of motion design and visual storytelling. Examples for such design agencies are Studio Insight, IQ Media and Meso (Koninklijke Philips N.V., n.d.). Their skills could be relevant in the development of implicit product communication on the inward looking surface of a "Lumalive parasol".

4.3.2 External Communication

For the purpose of this paper, the outward looking parasol surface reflects the external communication. Hence, the pictographic content which cannot be seen by the customer who is sitting underneath such a "Lumalive parasol". The external communication is determined for people who can see the parasol from afar. This includes people that are sitting inside of the restaurant but not underneath the screening surface. Furthermore, people like pedestrians that are walking by the restaurant, are affected by the external communication. In the case, that the restaurant is located in the proximity of a frequented road or other commuter areas, the external communication can be aimed at a variety of people.

A requirement for a OOH advertisement to grab attention, is the placement of the tool as well as the creative layout. With an average opportunity to see of one second, the messages have to be attention grabbing and suitably placed (Schweiger & Schrattenecker, 2009). Therefore, the layout for an advertisement on the top surface, has to be different to the one that is shown on the inward looking surface. Communication with bypassing pedestrians would need to be established in a short period of time.
In the book by Scheier and Held, the psychologist Stewart Shapiro conducted an experiment in which he was testing for brain activities and the recognition of ads in short period of time.

Test persons had to read a text loudly, that was fading over a display and simultaneously they had to follow the fading letters with the mouse courser. This task itself required allot of concentration in terms of reading, speaking and mouse control. While the text was fading through the middle of the display, advertisements where quickly shown on the edge of the screen. After the participants finished the reading part, they were asked to recall the advertisements and failed. At a later point in time the

participants had to choose products in a simulated shopping environment. The products that were chosen were significantly those, which popped up on the edge of the screens (Scheier, 2012).

It can be concluded, that even on a subconscious level, advertisements are recognised and lead to a call to action whenever the person is exposed to the advertisement.
Next to the exploitation of advertisements, Lumalive could also display content that stands in direct connection with the public limited environment. Lichtenstein suggests, that he could visualize daily menus on the surface of these parasols (Lichtenstein, 2016). This could become an added value for property owners, like Vapiano. Furthermore, information about upcoming events, bonus programs, news and the corporate design of a restaurant could be visualised on the surface. The variety of possible displayed content is to be seen as extremely diverse.

5 Conclusion of Requirements

This chapter will sum up and evaluate the criteria that got defined by the stakeholders, who are affected in the case of Lumalive´s market- entry.
The criteria were established during the interviews with the media agency Jost von Brandis and the system-gastronomy Vapiano. For the thesis, the experts are treated like representatives of the market participants, which would be affected once Lumalive enters the market in this kind. As the interviews were conducted with trustworthy experts, their statements are outlining five key criteria, which are desired by the different market components. For this dissertation, these criteria are seen as market standards, which have to be met in the market-entry approach.

A key finding of this bachelor thesis has been mentioned in the conclusion of the comparative analysis. In section 3.3 the comparison between Lumalive textile and imprinted banners resulted in favour of the light emitting textile in terms of price. Since the development of Lumalive in 2007, production costs of 2000 Euros per square metre have decreased to 100 Euros. Although, an imprinted banner textile is on average three times cheaper in production, Lumalive experiences a cost digression, when it is used more than two times. This also ranks as Lumalive´s important USP in the field of advertising. The characteristic of multiple displaying of advertising messages is a factor which outperforms traditional imprinted ad-spaces. Also the quality comparison revealed, that the common advertising banner could not keep up with the DOOH approach of Lumalive. Factors like the durability of both compared materials have shown, that Lumalive has a longer life expectancy than imprinted ad-banners. With regards to the scientific state of research in 2007, the Lumalive technology is not meeting the market standards when it comes to the resolution. As Claudia Zayer mentioned, the market standard in 2016 was a HD resolution for digital outdoor screens. Nevertheless, van Os has revealed, that LED´s every four millimetres are possible from a current state of technology. Thus, even a HD resolution could be achieved in a redesign of Lumalive textile.

Another requirement by the advertising market was stated several times in the Horizont journal. The managing director of the media agency Pilot said, that the market is demanding to plan and buy OOH advertisements in real time and DOOH is an approach, which could boost growing rates (Ansorge, 2016). A broadband connection to Lumalive could allow this real time buying approach to happen. This type of connection

was also described as being essential for the injection of targeting data into the display surface. In addition, targeting data was described as being indispensable for a digital advertisement, to become efficient in communication.
The system-gastronomy has proven to be a suitable place for the implementation of digital media tools. In the environment of restaurants, a variety of customers can be reached, who are target groups to advertisers. With the technology of cash register systems, valuable data about these target groups can be collected. In the case of a successful market entry within the gastronomy sector, it would be reasonable to establish a ranking system for "Lumalive Parasols". The ranking system would be based on retrieved data, that provides information about the qualitative and quantitative performance of a media tool. Through this method, the different locations of Lumalive parasols can be evaluated quantitatively, so that the process of media planning becomes more efficient and precise.

The requirement of the advertising market, to display ads in real time and not to wait for the ad to be glued onto a city wall, got realized in the recent years. With Lumalive, as a new potential DOOH screening surface, the remote displaying of advertisements in real time could also happen in public limited environments. A OOH trend, which got observed by the media agency Jost von Brandis, is the campaign-goals of advertisers. Claudia Zayer stated, that next to clients who want to achieve a wide reach for their campaign, they have recognised an increase in client requests for qualitative campaigns. With the abilities of digital ad-spaces, the client expects to show different content compared to printed ad-space (Zayer, 2016). These expectations are also advocated by the restaurant operators. Although, dynamic content is realisable on the Lumalive furniture, the creatives should focus on advertisements, that are not harming the atmosphere of a restaurant. In the thesis, the chapter about internal communication focused on the implementation of Lumalive so that it is not disturbing the interpersonal communication that is taking place in restaurants. It was assumed, that implicit advertisement would be useful, when established brands communicate with their target groups. The corporate identity of such established brands is made up of codes which can be easily identified by consumers.
For this approach, it needs to be assured, is that consumers decode a message in the way that it was meant to be decoded by the advertiser. Therefore, also legal standards, like the corporate colour scheme, need to be complied with, to fulfil a brands corporate identity (Scheier & Held, 2012).

With regards to the hypothesis, a potential market entry of Lumalive into the out-of-home advertising market is verified, as far as the statements of each expert is treated as a credible source of information. Lumalive got analysed on criteria that were outlined by the experts, of which each is representing a stakeholder of the implementation approach. Lumalive has proven to be a screening surface which could suit a majority of the criteria, that are needed to achieve a market entry in the field of digital out-of-home advertising media.

6 Final Reflection

Due to a market entry failure of the light emitting textile Lumalive in the years following its invention, this paper aimed at identifying the criteria for a possible market re-entry. Prior research studied the former exploitation of Lumalive and also some technical characteristics. This research provided the ground work on which the theoretical framework for the implementation was established.

This framework did not include a managerial accounting section, which could have helped in establishing a prototype for a business plan. The presence of such a section, would have allowed a brief cost calculation of a multiple usage of Lumalive. Furthermore, a monetary return on invest for the stakeholders of Lumalive could have been created. Unfortunately, this would have gone beyond the scope of this bachelor thesis. Nevertheless, some costs were stated within the comparison between Lumalive textile and imprinted textile banners. In the case of an extension of this paper, a comparison between Lumalive and two or three traditional advertising tools could add further data.

Additionally, the number of expert interviews would need to be increased in case of further research. One expert from each market sector is seen to be as sufficient for this scope of work. Nevertheless, the sincerity of each interview would increase, when the data obtained, through the interviews, would be approved by other experts in the same field of profession. Thus, the number of interviews should increase by at least three, in each sector. Adding to the existing interviews, an interview with an OOH publisher like Stroer or WallDecaux could have been valuable for the paper. Especially, interviews with the earlier mentioned urban design laboratories, could have provided information about the haptic implementation and also about the media buying process.

Regarding the implementation into the public limited environment of restaurants, one can think of a survey as being valuable to examine the public opinion about advertisement. However, the current market entry approach aims at the opinions of affected managers, rather than on consumers. Nonetheless, the public opinion should always be included.

The former CEO of Philips Lumalive, Bas Zeper, once said.

"*Lumalive brings fabrics alive and gives marketers a tool with which to reach their market in an interactive and more effective way*" (Weir, 2007).

I feel, that this is a very inspiring and finishing statement, which summarizes the potential, that Lumalive has in a modern advertising environment.

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8 Appendix

List of Appendices

Appendix A

Interview with Koen van Os Eindhoven 04.11.2016

A PowerPoint presentation, that was used in the interview, can be found on the CD, attached to this paper.

What is your Current Position at Philips Lightening and what is your field of work?

-I started at Philips in the year 2000 and worked in the field of micro assembling of hard-core electronics. The difference between hard-core and softcore is the substance that is inside the "light bulb" which gets electrified. Softcore bulbs are based on gas, that gets ignited and Hard-core bulbs have a harder material included, which gets ignited.

-I was the senior engineering manager at Philips for Lumalive in 2006

-From 2006 onwards I was exploring electronic textiles at Philips research

-I was also responsible for product and process developments with a strong focus on industrialization by bridging the gap between electronic and textile industries.

-In doing so, I was working in the PLACE-IT project.

-The PLACE-IT project (2007-2014) investigated Large Area Conformable Electronics by Integration in textiles and other soft materials. I am concerned with the issue how to materials around the light and not the light itself.

-I recently started working allot with the 3D-printing technology, with regards to the construction of the different components of the LED´s

What are the main fields of work that P.L. is facing at the moment?

-Philips is the world's largest company producing artificial light.

-Our mission is Taking light beyond illumination.

-We developed medical devices that is also wearable and eradiates blue light and is possible to cure muscle pain and painful backs. The chemical Effect of blue light to the body increases the blood flow and therefore illnesses can be cured faster. With a price of 150 € for the 10x10 cm Patch, it is affordable for the normal consumer.

-we separated Philips into two, Royal Philips which is dealing the healthechnology solutions and I am working for Philips lightning.

-We developed allot of systems called human sensory lightening solutions.

-Famous inventions come from Philips, like CD Players and Cassette recorders, X-ray

-About 50000 employees

-About 8 billion sales per year

-5% of this is reinvested in R&D

-We are number one in LED devices and connected LED systems and services (controlling of light schemes).

-Especially for governments(controlling street lights), cities, stadiums offices and industrial plants. Development of so called smart cities. But also home lightening.

-PhilipsHue is a very important project for Philips at the moment. It is a light bulb that fits into any normal socked and the wavelength (colours) are interchangeable. Also remote controllable. This is possible with the Zigbee system, a high-level communication protocol used to create personal area networks. It is comparable with Bluetooth.

-Probably everybody who is working with LEDs at the moment has a licensing contract with us.

-The production of LEDs got outsourced. Graph is showing why LEDs are produced by other companies. It is more cost efficient.

-Philips moves away from the component production and is focussing on the application of LEDs inside other materials.

What was the motivation for P.L. to develop a product like Lumalive?

-The technology of LED´s allowed multiple forms of application. As the leading lighting company, Philips tried to stay in front of competition and started these kind of projects very early. When it comes to the rivalry about patents, Philips always tries to take the position of a first mover.

-The textile industry showed great interest in LEDs being integrated into cloth.

-The main idea was to move away from ridged applications and to move towards flexibility. Bending → conformable (Graph shows the stages of implementation)

Tell me some of the characteristics of Lumalive?

-The poly fibre allows Lumalive to adapt to almost any shape.

-Even in the form of a T-shirt, Lumalive is able to display very dynamic videos on its surface.

-Pictures, texts, symbols and animations can get displayed.

-Interconnected with Bluetooth, different batches of fabric can "speak and operate with each other", for example in theses t-shirts

-A broadband connection (like wifi) is also possible, you can image what else can be done with this data exchange capacity.

- later on we increased the size to what we call wall panels, Large luminous surfaces. We do this together with the Kvadrat Company

-The LED´s are in existence since the 60´s but only used in indication lights and not for lightening purposes.

-what we have seen in the last 10 years was the transition from ionised gas lightining that needs ignition to solid lightining in which the light comes from a solid material.

-From a 5 % energy efficiency to more than 50% efficiency (200 Lumen per Watt). From Fragile to unbreakable. From Untouchable to touchable.

-Lumalive is capable of displaying pictures, animations and also movies.

Are there other effects of Lighting to the human reception?

-The human body reacts to the so called circadian rhythm. This is the lightening rhythm of the day and the night. The mood is greatly influenced by the intensity and colour of lightening.

-In the morning for example, when people have to get up to go to work blueish light is used to stimulate body activity. During the lunch time the colour of the light should change to create a warmer environment and the body can rest. Warm colours are used for that red/Orange. This is very similar to the wavelength of the sun. We also have this concept implemented into our campus interiors but also in an hospital in Maastricht and in the Berlin Charitee. It was found out that this effect can heal patients quicker. It got discovered when patients that lived on the south side recovered earlier than the ones on the north side.

Was Lumalive the first attempt in the market, to combine fabric with lightening / which similar approaches are there?

-I cannot give a comparison because there is none.

-Philips was the first on who tried this approach of combining lightening with fabric. This is also why they could file this patent.

-OLEDS will be the future for the next years and billions are getting invested in the middle east.

-In order to display content and video material to allow communication you would need high resolution.

Can you describe/show to me, how a square metre of Lumalive is built up?

-Every 3 cm there is a LED placed on the fabric.

-When you would put an LED every centimetre the resolution gets higher.

-The static city posters have a LED density of LED/4mm. From a current research perspective this would also be possible on flexible materials.

-The legal terms of a corporate design need to be fulfil able. He gives the example of the light spectre that suits to coca cola and T-mobile etc.

-Back in 2007 a T-shirt was sold for 2000 Euros. A person also started a renting service. -And although it was very high, he could do very good business.

-If you would do a redesign of this, the production cost would probably go down to less than 100 Euros.

-It is possible to produce couple of metres of this Lumalive fabric. Although Philips itself is not doing this, Philips is involved in some European projects that have this aim.

Can you say something about the quality of the pictographic content that can get displayed on the fabric?

-We called the Lumalive a low resolution display because we try to stay away from the display technology.

-It is washable already so it can be cleaned after messy weather but it is not guaranteed because nobody wants to take the legal risks.

-It allows sound absorption and dust absorption.

-Light in that way only allows to build up a scenery and influences the environment

-Lumalive would need to be unobtrusive in restaurants, when it is getting used to display images.

Who do you consider to be a suitable target group for Lumalive or similar products?

-It is a brilliant promotional tool for Roadshows and expositions

-The main client at the time when Lumalive got invented where car shows.

-There was also a little market for artist, who are interested in using LED technology on stage in a uniform for example (Micheal Jackson, Gorge Micheal, Black eyed peace, DJ hardwell)

-It was presented in the movie of Michael Jackson later on.

-LED suits got also implemented in Disney movies

Project Lumalive was stopped a few years ago, why was that so?

-It was not the right market at that time.

-In 2008 the car industry suffered from a huge depression. Marketing budgets where limited and there was no more money left for car shows.

-There was also an attempt to put the lightening aspect into protection clothes which got pushed aside because the fashion industry was not interested to produce such products because they thought, that the fashion aspect would get lost.

-The fashion industry is fluctuating allot from season to season during which they have to develop new styles. That means, that highly expensive technology would get thrown away after a couple of month/years. Always different colours, different sizes meaning different connections.

-There is still a big issue with fashion industry as a possible target market. The technological aspects and the fashion aspects speak a complete different language in terms of processing steps. The fashion industry is having steps in their supply chain from threats to fabric to cutting to painting to tailoring to two different sales person.

Which criteria need to be fulfilled to allow a market re-entry?

-We achieved a market re-entry when we increased the size to static wall-panels which we create together the Kvadrat.

-When communicating a message Designers are obliged to create a communication method that is implicit and very unobtrusive in order not to distract peoples communication.

-There are so much possibilities with light as indicator of something.

-Lumalive is a very interesting concept which is reliable. I think this is the way where we should focus on imbedded light

-There is allot of interest into the role to role material from the industry side but we don't see that much interest from the customers.

Appendix B

Interview with Tom Lichtenstein Hamburg 29.11.16

Was genau ist deine Position bei Vapiano?

-Mein Titel ist Operations Manager, genauer genommen Gebietsleiter. Ich kontrolliere bei Vapiano die Einhaltung aller Standards. Wenn man dies ein bisschen runterbricht bin ich Trainer der Restaurantleitung im Gebiet Nord (Bremen, Hannover, Hamburg)

-Ich bin für 5 Restaurants und 320 Mitarbeiter verantwortlich

-Weltweit gibt es mittlerweile mehr als 150 Restaurants, verteilt auf allen Kontinenten.

Wie viele Kunden hat Vapiano jeden Tag?

-Im Schnitt bedienen wir 800 Gäste am Tag pro Restaurant.

-Davon sind zwischen März und Oktober immer 150-250 Gäste auf den Terrassen.

-Sobald die Sonne scheint sitzt der Kunde draußen.

Welche Marketing Kanäle benutze Vapiano?

-Jeder Gast der mit einem guten Erlebniss das Restaurant verlässt ist der beste Markenbotschafter den wir haben können.

-Mitlerweile arbeiten wir mehr mit Stroer zusammen.

-Für uns ist das ein riesen Kostenblock, den wir nie hatten.

-Wir haben in Hamburg einen Bus beklebt.

-Vapiano Berlin macht sehr viel Kinowerbung.

-Im Jahr 2015 hat Vapiano Mitarbeiter in Uniformen und mit Kostproben auf der Straße vor dem Restaurant aufgestellt um den Umsatz anzukurbeln.

Was sagst du zu dem Thema Zielgruppen Targeting für Vermarktungsmaßnahmen“?

-Finde ich einen interessanten Gedanken.

-Wir messen mittlerweile viertelstündlich folgende Dinge: Gästeeingang, Gästeausgang, Schlangenlänge, Orders. Wir machen das, um Daten zu bekommen, die wir für zielgerichtete Service Angebote nutzen können.

-Wir haben die ersten Bonusprogramme die auf diesen gemessenen Daten aufbauen.

-Und ich bin mir sicher das dasselbe Prinzip mit Schirmen, oder generell mit Werbeplatzierungen im oder vorm Restaurant, funktionieren würde.

-Ich könnte auf meinem Schirm Menü Ankündigungen platzieren.

-Wir sind dabei unseren Durchschnittsbong mehrmals täglich abzubilden, denn dies würde uns dabei helfen, genauere Prognosen zu machen.

-Wir probieren alles zu messen, weil wir denken, dass es die Zukunft sein wird, soviel wie möglich über seinen Kunden zu wissen.

-Hierzu nutzen wir auch zum Beispiel tools wie die Peoples App. Wir können anhand von regelmäßigen Zahlungen über diese App genauere Nutzerdaten filtern und Kunden auf ihre Vorlieben besser ansprechen.

-Der deutsche Gastronomie Markt ist sehr langsam und viele Märkte um uns herum finden diesen Approach sehr geil und freuen sich darüber.

Inwiefern macht sich Vapiano Lichteffekte zu nutzen?

-Wir haben Lichtarchitekten, die bei der Planung eines Restaurants mit dabei sind.

-Wir haben Sensoren, die die Restaurantbeleuchtung gemäß den äußerlichen Lichtverhältnissen anpassen.

-Wir nutzen Licht um entspannende Atmosphären zu kreieren.

Wie könnten Sie sich eine effiziente Werbung auf Sonnenschirmen in Draußen-Bereichen vorstellen?

-Ich würde die Innenseite anders nutzen als die Außenseite des Schirms. Innen würde ich zum Beispiel mit Bildern aus der Natur belegen (Sternenhimmel, Wolken, etc.)

-Auf der Außenseite würde ich „werbe-mäßig Gas geben“.

-Ich denke, dass sich dies im Bereich der System Gastronomie schnell umsetzten lässt.

-Ich könnte quasi mehrere Male im Jahr die Optische Fassade meines Restaurants restaurieren ohne Restauration Kosten zu haben.

Wie stehst du als Operations Manager gegenüber dem Thema Werbung als Störfaktur?

-Ich glaube, dass die Menschen sich immer weniger von Werbung stören lassen.

-Es sei denn, die Werbung ist deplatziert und interessiert den Zuschauer nicht.

-Auch gerade in unsere Branche ist es wichtig Unterhaltungen mit Werbung nicht zu penetrieren.

-Das hängt sehr von der Altersstruktur der Kunden ab, da ältere Kunden sich davon schon noch gestört fühlen können.

Appendix C

Interview with Claudia Zayer Hamburg 01.12.16

Was macht OOH so interessant und anders im Vergleich zu TV oder Online?

-OOH lässt es zu, Zielgruppen orts-spezifisch zu erreichen. Ambient und DOOH kann man zum Beispiel total gut aussteuern.

-Generell sollte Werbung immer in einem Package aus vielen Verschiedenen Medien kommuniziert werden. OOH sollte in einer Kampagne nicht alleinstehen.

-Werbeetats im Bereich OOH sind in den letzten Jahren gestiegen, wegen einer Zielgruppenverjüngung und weil sich immer mehr junge Menschen auf den Straßen befinden und diese lassen sich über den Tag verteilt besser mit Außenwerbung erreichen.

-Außenwerbung ist das Stärkste Medium was Reichweite betrifft.

-Wenn du als private Person auf deinem privaten Grundstück werben möchtest, weil du z.b. an einer hochfrequentierten Straße lebst, kann man sich auch hier an einen Vermarkter wie Stroer wenden, welcher dich dann prozentual an den Mediakosten teilhaben lässt.

Wer sind die größten Verlagshäuser im Bereich Außenwerbung?

-Die großen Player im Markt sind momentan Stroer, WallDecaux und dann gibt es noch AWK. Das sind OOH Verlagshäuser, die Werbeflächen zur Verfügung stellen.

-Stroer und die anderen OOH Vermarkter haben eigene Abteilungen, welche Möbel und innovative Vermarktungsflächen designen und entwickeln.

-Mit der Aufgabe der Stadtgestaltung, implementieren die Werbeflächeninhaber ganze Möbelstücke wie Bänke oder Toilettenhäuschen in den Städten um die dann wiederum als Werbefläche an Werbetreibende zu verkaufen.

Wer sind die Haupt-Werbetreibenden im OOH Bereich?

-Fast moving consumer goods (FMCG) Unternehmen nutzen Außenwerbung stärker als Dienstleister, weil FMCG´s breiter gefächerte Zielgruppen haben.

-Wir haben auch Mittelständische Unternehmen als Kunden mit Geringem Budget 5000-10000 Euro welche gerne regional bleiben wollen.

-Aktuell sind es noch Tabak- und Getränke-Unternehmen die am meisten Geld in Außenwerbung investieren.

-Ein Grund dafür kann die Limitierung in anderen Medien sein.

-Bei uns im Hause Jost v. Brandis gibt es für Außenwerbung die Bereiche: Ambient, Transport und Digital.

Was muss man beim Planen von OOH Kampagnen beachten?

-Im Vergleich zu online Medien kann man bei OOH nicht mit granularen Internet-Browser-Verläufen planen, sondern muss sich anhand von Umfragen und Statistiken Zielgruppen erschließen.

-Wir Planer verfügen über Point-of-Sale Datenbanken mit denen wir Werbung nach Vertriebs Linien aussteuern können.

-Ein Werbeflächeninhaber wie Stroer oder WallDecaux kann frei entscheiden wen er auf seinen Flächen werben lässt. Oftmals macht es aber Sinn Werbetreibende die einen Bezug zu dem POS haben, auf diesen Flächen vor Ort werben zu lassen.

-Targeting hilft uns für die einzelnen Kampagnen hohe Reichweitenwerte und niedrige Streuverlustwerte zu erzielen.

Wie kann man sich einen OOH Einkauf vorstellen?

-Der Werbeflächeninhaber (Stroer, WallDecaux, AWK) mietet gewisse Quadratmeter und zahlt diese Miete an den Grundstückseigentümer. So fließen Mediagelder anteilig an die Grundstücksinhaber zurück.

-Der Grundstückseigentümer ist im Bereich OOH meistens die Stadt oder wenn es um Parkplatzflächen oder Terrassen geht der Inhaber der gewerblichen Fläche.

-Auf dieser Fläche kann dann OOH Werbung platziert werden. Hier variieren die Einkaufs-methoden je nach Werbemittel. (Poster, Litfaßsäule oder Digital)

-Qualitäten in der Bildauflösung sind mittlerweile fast gleich im OOH Bereich und Werbetreibende wollen, dass dieser Punkt beim Einkauf auch berücksichtigt wird. Sprich, digitale Werbemittel werden zunehmend interessanter, weil sie ein genauso scharfes Bild schaffen, wie Standardformate (Poster etc.)

-HD Qualität ist auf LED Billboard Screens mittlerweile Standard und auf solchen Screens will der Werbungtreibende seine Werbung sehen.

Was ist Ambient Media?

-Ambient Media ist eine sub-Kategorie von OOH. Es heißt, dass alle OOH Werbemittel die sich nicht im Umfeld Transport oder Digitalwerbung befinden zu Ambient Media gezählt werden.

-Bis vor 6 Jahren war Digital out-of-home (DOOH) ein Nischen-Medium in welches nur geringfügig Gelder investiert wurden und deshalb wurde DOOH immer unter Ambient eingeordnet. Mittlerweile gibt es 140000 digitale OOH Screens in Deutschland.

Wie wird Ambient Media geplant?

-Online-Agenturen fangen an sich für DOOH zu interessieren, weil dies der erste Schritt sein wird, Außenwerbung programmatisch buchbar zu machen. Bei Digital kann kontinuierlich optimiert werden, um ähnlich wie bei Online, Streuverluste zu vermeiden.

-Neben Kunden die mit ihrer Kampagne nur Reichweite generieren wollen haben wir immer mehr Kundenanfragen die mit Spezialideen qualitativ hochwertige Kampagnen gestalten wollen. Der Kunde will, wenn er schon die Möglichkeit hat Werbung digital zu zeigen, etwas zeigen was er in anderen Medien nicht umsetzen kann.

-Ich kann bei digitale Screens ein Targeting hinterlegen welches sich an Tagesuhrzeiten, Wettersituationen, Börsenkurse etc. anpassen und somit nur ausgewählte Motive wiederspiegeln. Auch Charakteristika von einer Person die vor einem digitalen Screen steht können mittlerweile erfasst werden wie zum Beispiel die Größe, das Geschlecht oder das Alter.

Welche Traffic Measurement tools gibt es im Bereich OOH und wie funktionieren diese?

-Wenn es um die räumliche Aussteuerung nach Zielgruppen geht, dann haben wir ganz viel Wohnumfeld-Daten, die wir uns von Datenanbietern wie z.B. der Gesellschaft für Konsumforschung (GfK) oder Microm, holen.

-Die Feinräumlichkeit dieser Daten reicht bis zu der Größe von einem Wohnblock genau.

-Wohnumfeld-Daten beschreiben das Verkehrsverhalte, Netto Einkommen, Geschlecht, Alter und Konsumverhalten von Zielgruppen.

-Gerade im öffentlich privater Nahverkehr (öpNv) welcher unter die Kategorie Transport Media fällt kann auf ein ausgereiftes Datennetz zurückgegriffen werden.

Macht es einen Unterschied ob ich als Werbetreibender auf der Straße werbe oder im öffentlich limitierten Raum?

-Die Anzahl der vielen verschiedenen POS´s macht es schwierig ein genormtes Netz zu formieren welches standardisiert und einfach zu buchen ist. Das Beispiel vom öffentlichen Nahverkehr zeigt, dass bei wenigen Anbietern auf dem Markt ein solches Netzwerk leichter aufzubauen ist. Verträge mit der Deutschen Bahn machen es leicht ein nationales OOH-Netzwerk aufzubauen.

-Selbiges Prinzip gilt auch für Kaufhäuser welche sich in einem Markt befinden der von Wenigen bestimmt wird.

-Edgarcards haben es geschafft sich als ein beliebtes Werbemittel in der Gastronomie zu etablieren, wo vorher ein werbefreier Raum war. Man hat schnell erkannt, dass man kleinere Zielgruppen mit coolen und innovativen Kommunikations-Ideen ansprechen muss.

Wie funktionieren Möbel mit Werbedruck in Gastronomien?

-Oftmals sind Gaststätten an so genannte Bier-Pachtverträge über einen langen Zeitraum gebunden und erhalten darüber Werbematerial, welches zu dem jeweiligen Produkt passt.

-Man kennt ja die typischen Mittel wie Liegestühle, Sitzpolster oder Sonnenschirme.

-Aber generell kann man sagen, das bedruckte Möbelstücke ein total geiler Blickfänger sind und jeder der das sieht bleibt erstmal stehen was zu einer hochwertigen Kommunikations-Qualität führt.

Worin liegen die Schwierigkeiten, bei der Einführung eines neuen Werbemittels?

-Die Schwierigkeit liegt darin, dieses neue Werbemittel für Werbetreibende auch interessant zu machen. Und die interessieren sich leider nur für die Reichweite ihrer Kampagne.

-Somit müsste ein neues Werbemittel in einer nennenswerten Anzahl von Outlets(Standorten) installiert werden sein, um ein reichweitenstarkes Netzwerk zu erschaffen.