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ENCOURAGING SUSTAINABLE URBAN ACCESS: AN EXPLORATORY STUDENT APPROACH TO DESIGN OF PRODUCT SERVICE SYSTEMS

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ABSTRACT

Urban access is a key trans-disciplinary design axiom looking to ensure that every member of the society can reach those locations and resources one needs for a sustainable standard of living and productivity. This should be achieved in a way that does not deprive others from their right to access the same urban environment. Crafting the future of urban transportation design is a dynamic process that depends on developing a thorough understanding of the complexity of the human needs that associate with delivering ways to support urban access and, in particular, more sustainable and socially inclusive mobility patterns. New market demands and customer expectations force public and private organisations to expand their commitment to cross-border collaborations to provide attractive alternative transport modes. This paper discusses the challenge of utilizing design innovation as a tool for eco-branding and how an exploratory approach to this has been used in a post-graduate course in Visual Brand Identity and Product Design. Seven research teams, closely guided by the authors, were affiliated with designing an innovative hypothetical bike-sharing scheme for the city of Gothenburg, Sweden, with the potential to captivate road users' acceptability. An overall description of the project concept and a brief summary of the results produced are presented herein. More specifically, this paper concentrates solely on one of the most innovative projects delivered within the course and discusses how the students adopted the challenge, as well as the actual project outcome and its contribution to the overall learning experience.

Keywords: Branding, Product Service Systems, Bike-Sharing Schemes, Urban Access, Sustainability

1 INTRODUCTION

Due to the car-centred urbanization trend that most cities around the world embraced as one of their prime development cornerstones, they have transformed to built environments in which the numbers of automobiles in a few years, if no precaution is taken, could become unsustainable. This is an eventually devastating urban futures scenario, which would have an adverse impact on these cities' overall ability to provide acceptable living standards for the people functioning within their premises. Therefore, the era of designing cities as if car access alone was sufficient appears to have ended [1]. This also means that there is a need for research-driven education that seeks to expand the knowledge spectrum of young designers in terms of effectively delivering alternative transport options – options that would serve the increased urban mobility needs of the society for a more balanced modal share. Such education should see design in a very distinctive way, surpassing its basic role as a medium that guides product development to optimum levels of performance. Design will be defined as a shared process between the designers and the society as a whole. It is founded on human-oriented technological innovation and associates not only with the delivery of a good product but with a complete and homogenous product service system. Such a systemic educational approach to design could become a key approach to facilitate new knowledge generation that enables transition from an existing transport system, dictated by conventional car orientation, to a multi-modal one that prioritizes alternative product system innovation.

Design education in urban transportation should concentrate on analysing the merits of alternatives to car transport options that have the potential to support more sustainable mobility patterns – an approach that was also adopted in the work reported in this paper. A shift of focus from utilizing “design” as an apparatus for prioritizing car use to actually introducing or improving the design of more sustainable urban transportation modes, and raising consciousness about the social benefits of their use, is the right way forward for a voluntarily rather than regulatory modal share change [2]. A bike-sharing scheme could be the very definition of such an alternative transportation mode.

A bike-sharing system (or a public bicycle system) is a combination of bicycles that can be picked up and dropped off at numerous points across an urban area with an appropriate transport infrastructure built to accommodate their use. Bicycles are available to the general public for short-term use, for free or for a small fee, and provide a fast, convenient and flexible transport option for short trips that can be seen as part of the public transport system [3]. The principle of bike-sharing is simple: individuals use bicycles on an “as-needed” basis without the costs and responsibilities of bicycle ownership [4].

Public bicycles have several advantages over other modes of public transportation for short-distance urban trips because of their potential to: a) reach underserved destinations; b) require less infrastructure; c) be relatively inexpensive to purchase and maintain; d) not add to vehicular congestion; e) not create pollution in their operation; f) provide the user with the added benefit of exercise [5]. This pool of advantages is the reason why over the past ten years, bicycle-sharing schemes have developed from being interesting experiments in urban mobility to mainstream public transport options in cities as large and complex as Paris and London. Today there are an estimated 375 bike-sharing schemes operating in 33 countries in almost every region of the world using around 236,000 vehicles [6].

These recent experiences suggest that bike-sharing systems can indeed act as a door opener for increased bicycle use [7]. More specifically, public bicycles have the potential to increase the acceptance of cycling as a legitimate urban transport mode in cities that still lack a good level of bicycle use. In cities that a good cycling mentality is already in place, a competent bike-sharing scheme could add a valuable element to existing mobility services; something that enhances the transport system’s overall potential in terms of providing option value. A public bicycle scheme is therefore a low cost and green public transport alternative, which could be not only encouraging but practically facilitating intermodal travelling.

2 VISUAL BRAND IDENTITY AND PRODUCT DESIGN COURSE

In 1999, the introduction of a five-year taught academic programme in Industrial Design Engineering at Chalmers signified the University’s specific focus to create a competent academic platform ready to foster its students’ analytical, creative and strategic skills when designing new products. In 2004, the course *Visual Brand Identity and Market Analysis* (7.5 ECTS) was introduced to give strategic design and branding a more prominent position in the design education at Chalmers [8]. The course name was recently changed to that of *Visual Brand Identity and Product Design*, something underlying the growing need to embrace design in broader and more socially oriented terms than solely focusing on market demands. The goal of the Visual Brand Identity and Product Design course is to provide students with a learning experience that will allow them to develop a theoretical and empirical understanding of: a) how aesthetic and symbolic qualities of products can be used to support and develop the visual identity of brands and b) how human-centred design innovation could provide viable but the same time attractive answers to some of the society’s most urgent needs.

The course is organized around a series of lectures and a main group project. In the lectures, students are introduced to a range of design and branding theories, which are complemented with practical insights from high-level professionals from industry. This knowledge transfer process is supported from the provision of an up-to-date literature package, which allows students to build a deeper understanding of the field. The group project is designed to enable the students to use what they have learnt through an early term analysis exercise on automotive brands as a starting point for designing and branding new products; in this particular case, a new bike-sharing scheme for the city of Gothenburg. All in all, the course brings together a variety of concepts to form a holistic picture of the role of branding in design, with an emphasis on making innovative new products that answer society’s specific needs visually attractively [9].

3 THE BIKE-SHARING GROUP PROJECT CONCEPT

Seven teams of four to five students were formed for the course project. Each team was affiliated with a given automobile brand in a pre-project exercise. The purpose of this initial working phase was to assist the students in gaining an empirical understanding of the product design tools available on the field of transportation as well as in employing ideas from a tested branding background for designing an innovative hypothetical bike-sharing scheme for the city of Gothenburg. The project's basic requirement was a dual one. First, a new fictive brand (which could have been a branch of the group's affiliated automobile company) that specialized in sustainable mobility design had to be created. Subsequently, teams were asked to design a new product service solution that had to be an upgrade of the current Gothenburg's bike-sharing scheme in place.¹ The theoretical framework to support the development of the group work was founded on the design axioms of sustainability, in general, and urban access, in particular. The overall design was specifically aiming at the delivery of a reality related design proposition for a product service system; one that could lay a foundation for a more balanced modal split within Gothenburg by making bike-sharing a more popular travel option. This is a particularly challenge due to Gothenburg's adverse topographical and weather conditions. The authors served the process by being the supervisors and eventually the assessors of the students. Their task was to guide the students' steps towards the fulfilment of the project and to make the learning experience an interactive applied research process.

4 EGO – AN INNOVATIVE BIKE-SHARING SCHEME FOR GOTHENBURG

This section of the paper concentrates on the most advanced design proposal delivered for the means of the course: the eGO project as an exemplary study result of one of the participating student groups. The authors present a short synopsis of the brand concept and the hypothetical scheme's main design characteristics providing concrete justification for the group's specific design choices. Figure 1 illustrates the eGO design project's main components that will be described in the following paragraphs. It should be noted that a significant amount of the eGO project's design richness could not be communicated in a detailed manner through the means of such a concise paper.

4.1 The concept of eGO

eGO is sustainable design brand referring to an innovative electric bike-sharing scheme that means to promote an active lifestyle in European university cities in general and in Gothenburg in particular. eGo is a fictive eco-brand created by the student group initially linked to Audi and this is why it shares some of the key design philosophy values that are attributed to the German automotive industry colossus: such as progressiveness, creativity and commitment. Audi was also the hypothetical sponsor of eGO, making this link a potential supporting device to Audi's appeal to younger market audiences. The brand name eGO is built up on two parts: "e" that stands for electricity and "GO" that denotes the status of being on the move. Nevertheless, eGO also connects both to Audi's electric and hybrid car concept category "e-tron" and more importantly to being egoistic. Cycling is a way to transport oneself to another location; an individual and autonomous move. This however does not symbolize a self-centred attitude entirely disengaged from pro-social behaviour; on the contrary, using this bike-sharing scheme is a way to make a personal statement about actively doing something for a more sustainable future.

4.2 The design of the eGO bicycle

Since an electric bike is already a relatively new and somewhat revolutionary feature in the context of bike-sharing schemes, the design of eGO could not have been that much more far-reaching. It is important to be different and draw attention, but at the same time consumers tend to see a too radical design as controversial instead of new and exciting [10]. The futuristic design elements of the single-sided front fork and the lack of extra supportive bars for the back wheel embrace the brand value referring to progressiveness. The inclusion of the bicycle basket in the overall design makes the bicycle a vehicle that could be shopper-friendly. Furthermore, a holder for a smartphone and front lights were placed on the basket. To further emphasize the premium and technological heritage of a brand hypothetically affiliated with Audi, break disks and belt drive were used to increase safety

¹ Styr & Ställ is a self-service bike rental system spread across 50 stations throughout the city centre of Gothenburg with approximately 600 bicycles that have not yet captivated road users' attention.

measures, ensure a smooth ride and reduce the need for maintenance. The eGO bikes were also designed to be equipped with bells, reflexes, front- and back hand brakes, as well as non-slip pedals for safety reasons. Another safety feature related with the implementation of a chip that communicated with a “bicycle alert system”.

4.2 The design of the eGO stationary facilities

The main terminal and bicycle rack were designed according to the principle that styling new products in a similar way as existing products results in recognition and association to an already existing product identity [11]. The shape of the main terminal design meant to be discrete, yet dynamic. The front piece was embracing the use of a bent metal plate, meant to create distinctive split lines along the short edges, giving the sense of precision. The sharp bends imitated a tornado line, in order to give a sense of activeness and movement. The bent back shape of the front was taken from the tornado line, which gives the terminal a leisure look. The interface gave the user the option to choose language between English, Swedish or German, as well as buying a subscription, a 3-day card or using an already bought card. The user was also provided with the opportunity to check the availability at other stations, check if any stations were closed due to maintenance or check the remaining time of the user-card. The stations were designed in such a way that could be advertisement tools of eGO at the same time as being a keystone providing structure to the system.

The bicycle stand's main shape followed the design elements of the bike, something that shows the homogeneity of the overall concept design. The upper part covered a section of the battery compartment when the bike was parked. The stand also connected to the terminal through a sandwich-construction with two metal plates embracing the middle part. The arrow shape of the stand was chosen to denote the notion of movement and implied that this was the start of a progressive journey. The interface of the stand was very minimal and therefore easy to use for everybody, with only one button for unlocking the bicycle. LEDs that used different light patterns, depending on the status of availability, were placed on the side of the stand and in the ring surrounding the button. For example this design characteristic could have been made visible to the system user from a longer distance to tell whether there are empty stands available. Overall, the design of the system avoided the excessive use of colors, something that could make it easily adaptable to Gothenburg's architecture. At the same time, the design of the system was challenging enough to attract the attention of the road users accessing the city centre.

4.3 Pricing and positioning eGO

In terms of pricing, eGO was supposed to support the use of a three-day pass and a seasonal card policy with affordable charges. The passes were designed to give a 30-minute free use every time a bike would be picked up; additional minutes would cost extra. Free trials during the introduction of the system and discounts for students would be used to create incentives for new users. The only payment method available was by card, so that funds would be reserved in case of vandalism or theft. Focusing on the city centre of Gothenburg, the eGO stations would be located at major hubs for public transport and close to universities. The eGO product service system meant to promote a more vibrant city life with stations strategically located around the city center. This was a choice designed to support interoperability and accessibility. The possibility to connect the eGO membership with a Västtrafik card (i.e. a public transport card for Gothenburg) was part of the overall planning to further enhance the integration of eGO with public transport. This was likely to facilitate the acceptance of the scheme. The new road pricing scheme in the centre of Gothenburg makes the integration of public bicycles in the city's transport system an urgent need. Thus, the eGO stations would have been placed at the toll borders to provide a valuable transport option to commuters using park and ride facilities.

4.4 Bringing intelligent technology on board

The eGO product service system was complemented by a smart application. The application enabled users to receive important information about the system in real time. The users could find for example the nearest station and check how many bikes are available for hire. Additionally, users would have been able to book bicycles via the application 30 minutes prior departure, which could help them to avoid unexpected delays. The application would also equip the users with a map of the city, which would provide them with information relevant for their traveling (e.g. most efficient route, roadwork and dangerous crossings). Apart from the functions listed above, the main idea with the application

was to involve the users in the development and maintenance of the eGO system, embodying the principle of creating a movement using social media. The possibilities are endless, because the addition of this intelligent and interactive function could provide the users with the opportunity to be co-managers of the system in one sense. The application thus added a new dimension to the normal user experience of a bike-sharing scheme.

4.5 Assessing eGO as a medium for changing travel behaviour

The electric bicycles could make eGO a more attractive and accessible travel option as they could eventually support a bigger road user audience including people that may lack the physical ability to use regular bicycles especially when considering Gothenburg's hilly topography. These vehicles are therefore much closer to provide the benefits of conventional motor driven transportation modes despite their undeniable value in terms of sustainability. Thus an electric bike-sharing scheme has the potential to smoothen the transition from motorised transport to cycling, making the city less car-oriented. eGO was all about creating an entirely new user experience by making urban transportation accessible, comfortable and efficient but at the same time green, healthy and joyful. The unique design, the smart application and the progressive stationary facilities technology and overall image of the scheme could create added value compared to the bike-sharing system in place today.

Concerning the economy of the system, there is a twin benefit associated with its eventual implementation. First, the user could get access to a really good bike service at a low cost. Second, the city could gain a better climate, healthier citizens, less road maintenance, and also a new iconic image similar to that of Gothenburg's blue trams, this time associated with active mobility. A growing number of cyclists would force the city to adopt a more bike-oriented identity by expanding the bicycle lanes and investing more in sustainable transport. eGO maximizes its potential as an interoperability apparatus since it would be integrated with the city's public transportation system by being strategically spread in the main venues of the city centre and close to the new road pricing toll stations.



Figure 1. Illustrating the vehicles and stationary facilities of the eGO design project

5 CONCLUSIONS

Automobile use is a significant contributor to climate change, local air pollution, pedestrian injuries and deaths, declines in physical activity and obesity [12]. Bike-sharing is one mobility strategy that could help the society address many of these concerns [4] and maximize a city's potential to offer acceptable levels of urban access to the people functioning within its premises. Thus enhancing the knowledge foundations of a new generation of designers via a research-driven postgraduate exercise meant to focus on how to hypothetically establish a human-centred public bicycle scheme is indeed a timely and meaningful educational process. On the whole, this paper advocates that design education in general and transport design education in particular, should be concentrating more and more on product system innovation that favours human factor considerations and assists society in making sustainable urban development pathways more transparent.

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