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KNOWLEDGE-BASED PROMOTION POLICIES IN SUSTAINABLE CITY TRANSPORTATION

PRIMA WIDIYANTO[1], SRI MURNI SETYAWATI[2], NUR CHOIRUL AFIF[3], M. ELFAN KAUKAB[4]

[1,2,3]*Faculty of Economics and Business, Universitas Jenderal Soedirman, Purwokerto, Indonesia*
[4]*Faculty of Economics and Business, Universitas Sains Al-Qur'an, Wonosobo, Indonesia*

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ABSTRACT

Policy analysts have long realized how important it is that promotions are based on knowledge. Knowledge-based promotion is a strategy built by profound knowledge of consumers' needs through scientific methods. Some areas, especially those related to sustainability, have applied policies of promotions based on knowledge. These policies indicate different performances depending on various factors. One sector that has not applied knowledge-based promotion policies is sustainable city transportation. This article identifies the strategy of knowledge-based promotion suitable to encourage the growth of sustainable city transportation. Previous studies provide the insight into the policies, along with other factors determining their effectiveness.

INTRODUCTION

Transportation is one of the sectors contributing to global warming and climate change due to its gas emission from machine combustion to the atmosphere. Governments around the world are trying to reduce the impact by making sustainable transportation policies. European Union, for example, has made 2050 transportation strategies aiming to reduce the emission by 20% in 2020 and 80%-85% in 2050 compared to 1990 [1].

Sustainable transportation is transportation that fulfills mobility needs while maintaining dan enforcing human health and ecosystem, economic development, and social justice in the future [2]. It is different from the usual transportation as it emphasizes accessibility and quality instead of mobility and quantity. It also accentuates interconnection rather than nonconnection. It avoids following the trends, works backward toward the vision rather than moves forward accepting demands, manages demands instead of facilitates them, calculates social and environmental costs, and encourages integrated planning [3, p. 3]. Included in this

type of transportation are walking, cycling, public transportation, and traditional private accommodation, such as car and train powered by renewable or highly efficient fuel.

The global trend to adopt sustainable transportation, especially within cities, has driven this research. The need emerges as the double-goal modern city transportation planning with increases. On one side, it gives green, healthy, and equal access to all citizens. On the other side, it provides a faster and farther mobility capability [4].

This paper aims to explore the policies presented in the literature related to knowledge-based promotions to encourage sustainable transportation. Previous studies scarcely analyzed the strategies that foster it [5]–[7]. They are limited to quantitative studies to identify the determinants of the public's reception to sustainable transportation [8], [9]. There is a gap in it in meta-analysis and the review of the literature. Meanwhile, governments of many countries need policies to boost efficient and effective sustainable transportation. Knowledge-based promotions are relatively cost-effective and efficient. Therefore, we use that kind as the topic of this literature review.

The rest of the article is divided into four parts. The second part reviews the knowledge-based literature. We present the method and results of the literature collection in part three. Part four discusses the result, while part five concludes the research and its implication.

KNOWLEDGE-BASED PROMOTIONS

Promotions are ambiguous. They are efforts to market products to the consumers [10], but they are also tools to aim a higher rank in an organization [11]. In this article, we refer to promotions as a part of marketing activities, not as a part of human resource development. In this context, knowledge-based promotions are efforts made to promote foster sustainable transportation to the public using information rather than social, emotional, or policy features. Morgan [12] defines knowledge-based promotion of sustainable transportation as "the deliberate use of publicity and marketing to communicate the selective fact of sustainable transportation to the targeted audience."

The promotion of sustainable development can take various forms. In sustainable stormwater management, the approach is aesthetic-based promotion [13]. The general knowledge-based strategy is the one in the national park [14]. The experience-based strategy is common in sustainable tourism destinations [15] and farming [16]. It is also present in local entrepreneurship [17]. The general notion is that the strategy applied will depend on who the target audience is [18].

The appropriate promotion requires knowledge of the factors influencing a person in using sustainable transportation. A number of studies have revealed those factors. One research in China found that they include personal norms, subjective norms, perceived controlled behavior, and attitude [19]. Personal norms are affected by the awareness of the consequences,

responsibility ascription, and subjective norm. The last item is the most affecting item. Awareness of the consequences is another factor almost as strong. Another study revealed that it and guilt define personal norm to use sustainable transportation [20]. However, the strongest factor is the attitude [19]. It is a construct containing cognitive and affective components [21]. Thus, there are two possible ways of influencing the public by using knowledge-based promotions. One is the knowledge of the consequences, and the other is attitude-shaping knowledge.

A study in the same country researching intention to use transportation revealed that knowledge significantly influences it, behavior, subjective norms, and perceived controlled behavior [21]. It also found that the awareness of sustainable transportation advantages and traffic problems affect significantly environmental care and acceptance, stronger than the government policies and symbolic motivation do [22].

Previous studies have also revealed the importance of knowledge in shaping sustainable transportation behavior. Research on e-bike found that it is one of the crucial factors in adopting e-bike, especially of health advantages and the others (besides mobility and symbol) [23]. The researcher unraveled that the awareness of consequences and health advantage gives a positive effect on forming the attitude of e-bike usage [24]. It is the strongest factor in defining the intention of biking.

A study in Malaysia on bike-sharing usage showed that attitude is the most influential factor in the intention, compared to the subjective norm and perceived controlled behavior [25]. Liu et al [19] identified the role of low carbon awareness in defining low-carbon travel. Mei et al [26] investigated the impact of low carbon awareness on the behavior of using low carbon transportation. Meanwhile, Abrahamse et al [27] revealed that awareness of the consequences decreases the intention of using unsustainable vehicles.

Steg dan Gifford [28] studied the correlation between sustainable transportation policies and life quality. They asserted that sustainable transportation aims to improving society's life quality rather than merely to knowledge. Nevertheless, they warned that very few people cognitively involve with transportation issues. The others are cognitive misers. They are the people who do not want to think far ahead because such thinking will be tiresome [29]. Steg and Gifford [28] also elucidated that it happened because those people have limited knowledge of the matter and less attention to sustainability. Both researchers provided no clear recommendation that can be applied practically in the knowledge-based promotion. Through their statements about information deficiency on sustainability, it is inferred that policies of knowledge-based promotions are crucial and can help people to think.

Mashayekh et al [30] reviewed the potential of sustainable transportation to reduce the impact of climate change using five strategies. They are price policy (costly and expensive fare for unsustainable transportation), transit unmotorized intramode trip policy, parking lot utilization policy, travel reduction policy, and public information campaign policy. They found that the

campaign policy has short to medium-term benefits. It has a low to high effect on the decline of greenhouse gases, and it highly implementable with medium to high costs. It is comparable to the transit strategy, which is also implementable with the same range of cost. But the latter has a lower effect on reducing the green-house effect without a long-term impact [31].

The elaboration has provided a foundation that knowledge is a crucial element in building society's intention to use sustainable transportation. As a consequence, people need to accept sustainable transportation policies to elevate their knowledge. It will, in turn, mold the attitude, subjective norms, perceived ease, and social norms that will eventually boost the goal of using sustainable city transportation.

METHODS

We chose international journals, research reports, and dissertations as our international partners. We searched under the keywords "increasing knowledge" + "sustainable transportation" and "information campaign" + "sustainable transportation" through the Google Scholar search engine. Each article is examined to see its promotion strategy. The search is over when new information no longer appears or when the articles shown are no longer relevant to our aim. We discovered eight articles describing knowledge-based promotion policies in sustainable city transportation.

RESULTS

We begin the review from the work of Lopez [32] that studied the Europe mobility week campaign to encourage sustainable urban mobility in Horsens, Denmark. In it, the initiative is providing public transportation tickets to anyone willing to switch from their cars to public transportation. After that, an information and personalized campaign is carried out to give the passengers the best options. This approach manages to reduce 14% of car usage.

In terms of the policy, Alvemo et al [33] developed a system of strategic guidelines to plan sustainable transportation. It is called an S-E-A-T approach, a short form of Social-Environmental-Administrative-Technological. The social feature discusses behavior, accessibility, aspiration, safety, and comfort. The environmental aspect reviews the ecosystem, geography, emission, and chemistry/metal flow. The administrative one evaluates politics, economic, legal, planning management, coordination, and communication. The technological aspect examines resources, energy carrier, motoring, infrastructure, and knowledge-base. S-E-A-T is designed for policymakers in deciding the strategy of sustainable urban transportation. It is interesting to note that while the evaluation takes place, the knowledge of the policymakers is increasing.

Putz and Treibelmaier [34] employed a gamification approach in their research, which not only provides knowledge but also maintains students' awareness of the importance of sustainable

transportation. Gamification is the use of a game element in a non-game context to boost motivation, encourage information processing, increases achievement, and alters behavior. Their participants were 384 students. They were assessed in three rounds: the short, medium, and long-term. The researchers found that gamification is effective in maintaining students' knowledge only in the short-term.

De Rooij dan Werges [35] designed a Going Green Program to encourage sustainable traveling movement to hospitals, which reduces car visits to the hospital by 50% in a year. The first year expects to have a 10% reduction. This program aims at outpatients. A poster is drawn containing information on the personal trip plan, the available public transportation (including their time and frequency), the costs of using public transportation versus private car (they are calculated based on the fuel consumption, parking fee, and monthly cost), the description of how to use it, the environmental benefits, and hospital information. It is sent via emails to the patients. For the patients living within a 2 km range from the hospital, the poster is delivered by mails. Unfortunately, their research described only the design that it is impossible to know the outcome of the program.

The internet, especially social media, is also the target of the information campaign. A study by Hasselqvist et al [36] researched three Sweden families that sold their cars and chose the electric ones for daily transportation. It found four factors supporting these families to use their choice up to this day. They are the knowledge, sustainable service of car producers, support from the surrounding society, and health benefits. The knowledge support lies in social media, in which they are members of a Facebook group that shares useful information on electric car usage.

Steg dan Tertoolen [37] reported the Rotterdam policymakers' plan to have a massive scale market advertisement promoting public transportation. The psychologists suggested its cancellation prior due to its ineffectiveness and a waste of money. The alternative policy aims at small groups of targets. They are chosen from the areas where the people are most likely altering their private vehicles into public transportation. In these places, information comes in various ways, such as school subject, commercial, and free publicity in the newspaper as well as in radio. Additional rewards are also available in the form of a service-equipped carpool and free breakfasts for those parking their cars often. An information center aids interested people. The program results in a decrease in private car usage from 84% to 80% and the increase of car-pooling from 16% to 20%. The number of companies encouraging their employees to join the car-pooling program also rises from 39% to 46%.

Wiesinger [38] studied the smart mobility policy applied in several European countries. In Malmo, Italy, the campaign encouraged bike usage. In this project, the government's policies are of infrastructure and informational. The infrastructure policy takes the form of increasing bikers' safety at crossroads, installing bike detectors, and integrating bike parking lots with hubs to the main public transportation. Meanwhile, the information campaign includes marketing and socialization of bike city plan promotion. This campaign is a notification of the health and

other benefits of biking. The combination of the two policies decreases bikers' stop time at traffic lights from 64% to 47% and waiting time at red lights in 2-7 seconds. The information covers 50% of the whole city population, and 10% of them stated their intention to change their transportation. There is an increase of bike users from 20% to 22%.

We also found a case with negative output. A study by Ge et al [39] is an experiment of information board installment on buildings to encourage multimode transportation. The researchers put a screen displaying information on real-time multimode transportation in a building's lobby in Seattle, Washington, United States of America. Two other buildings are the controls. The employees working at the three buildings were surveyed a month before and after the installation. Although 70% of them realized the board was there, only one third actually used the screen to meet their needs. However, the researcher assumed that it was not the framework that is faulty, but rather it was a matter of technical issues, such as site choice, screen placement, and marketing aspects.

DISCUSSION

The general overview shows that a knowledge-based promotion strategy does not always succeed in boosting sustainable transportation. A seemingly simple approach that works well in a context might fail at a larger one. As an example, the direct information exposure strategy succeeds in a hospital's campaign, but it does not work at a larger scale in Rotterdam. There, the complicated strategy aiming at a specific target generates positive results. It is inferred that generally, the wider the audience is, the more complicated the policy that should be applied.

We need several contextual variation and combination with other strategies to yield effective results. Each one has its advantages and weaknesses. Thus, the right combination with non-knowledge can cover the flaws of the existing knowledge-based strategy. It requires comprehensive planning, which considers social and administrative issues as well as the available supporting technology. In this case, the S-E-A-T framework is the promising one for policymakers of sustainable transportation.

The successful promotion policy combination is the one based on the knowledge that is combined with the efforts to develop infrastructures. Theoretically, it aims at two out of three crucial determinants of attitude. The planned behavior theory formulates (Ajzen, 1991) three factors determining behavior. They are attitude, subjective norms, and perceived behavioral control. The knowledge-based promotions can shape attitudes in the short-term. In the long-term, they form subjective norms. The perceived behavioral control comes from the easiness to perform the behavior. In this case, the infrastructural-based policy will help the society to feel ease and comfort in using sustainable transportation.

CONCLUSION

Strategies of sustainable city transportation need a knowledge-based approach combined with other approaches, such as emotional and aesthetics. We emphasize the importance of knowledge in encouraging sustainable transportation behavior. Society should be educated about this. Thus, we recommend that policymakers and non-governmental authorities have knowledge-based campaigns in increasing people's intention and attitude to use sustainable transportation. Given that knowledge is important in it, it is necessary to have promotional campaigns that make the public aware of climate change and its impacts. They need to know that sustainable transportation saves energy, supports conservations, and reduces the impacts of climate change. In turn, these efforts reduce energy consumptions that have been causing global warming (Zhang et al, 2016). Needless to say that they require tangible attempts in limiting unsustainable vehicles, reinforcing laws for the offenders, and facilitating those complying with environmental rules. The campaigns need strategic and holistic plans, which also consider the impacts on the poor and marginalized members of society.

Promotional policies call for researches at the local level to justify that the knowledge factor plays a role in the intention of using sustainable transportation in certain geographical regions. Current research only shows that knowledge is an important factor in various contexts, but not all. A city government can conduct a survey and multivariate analysis to examine the factors influencing the public's intention in using sustainable transportation. This local knowledge gives input for the promotional policies. Despite our belief that it is crucial, we know that there are places where it is not the decisive factor, but the image factor is [40]. Image is a social construct that closely relates to subjective norms, rather than to attitude. However, some studies found that subjective norms are influenced, at least partly, by people's knowledge of environmental impacts [21]. To have more impacts, it needs strategies that combine knowledge with other factors forming an image, such as aesthetics.

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