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THE IMPORTANCE OF THE PUBLIC ACCEPTANCE THEORY IN DETERMINING THE SUCCESS OF THE VERTICAL FARMING PROJECTS

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Abstract
The main point is what is the role of public acceptability? The relevant question is how the public reacts and how we change our socio-cultural perception of Vertical Farming as a new technology or new innovation. The answer shows us the importance of study in related to the of Vertical Farming. There is a lack of comprehensive empirical studies exploring the status quo of Vertical Farming in all its different forms and functions. Existing empirical studies mostly focus on the construction technology or the agricultural technique of Vertical Farming. So far, no research addressed the factors contributing to the acceptance or rejection of Vertical Farming. The present research hopes to fill this gap and contribute to a better awareness of that. In this study, public acceptance as one of the important factor of accepting or rejecting the Vertical Farming is discussed and reviewed by qualitative approach. A comprehensive literature reviewed on public acceptance of Vertical Farming in relation to the food security. The study resources were formed from different sources from 2007 to 2017. Through its broad theoretical coverage, this research provides the valuable groundwork for future studies on public acceptance of Vertical Farming. Also, this body of research shed light on practical experiences or ways to solve current problems, and hope to encourage innovation or repeat projects that were successfully implemented elsewhere in the world.
Keywords: Vertical Farming, Public Acceptance, Food Security, Community Acceptance, Socio-political Acceptance, Investor Acceptance

1. INTRODUCTION

We presume our life in a technologically based society and submit to changes that result from our mental curiosity. A city that abides by no-waste policies will change the way people perceive city life as compared to rural life. Rural people could think their life is safer. However, the first most dangerous job worldwide is farming

(Besthorn, 2013). If seen from the new innovation perspective, society's links with modern farming are dubious: First of all, there is growing criticism about modern farming and then people also adore certain aspects of it, e.g. higher food safety and low costs of food. For instance, as maintained by Specht et al. (2015), stakeholders were aware of the absence of public acceptance as main disadvantages for indoor farms. In cities, the spatial and social gap between citizens and farming is increasing and many people have limited experience or knowledge of farming (Specht et al., 2015).

Vertical Farming (VF) initiative is located in a large field of urban agriculture. VF as a new method of modern agriculture is the practice of producing food in multistore building or tower in controlled environmental conditions. A proposed system of growing crops using hydroponics and aeroponics with access year-round crop production in urban areas. In this system, all crops are grown organically without herbicides or pesticides in combination with aquaculture and livestock production. The vertical farm is powered by wind energy and solar to reduce the high-energy consumption. Also, the black and greywater are collected and recycled in this system (Despommier, 2013; Kalantari, Mohd Tahir, Akbari Joni, & Fatemi, 2017).

So, VF as a new innovation is open to scholarly controversy that shows a great potential for the emergence of innovation (Kalantari, Tahir, Lahijani, & Kalantari, 2017). New ideas are put forth with regard to their use, while questions of the introduction process are dealt with only afterward. The second category of investigations focuses on the social, environmental and economic potential and limitations of innovative urban farms especially VF projects. In this case, innovations are viewed as a complicated issue that involves technological, organizational and societal dimensions. However, the innovation process itself is only considered as a side effect. Especially in the case of European cities, VF and the related research has just recently begun (Menezes, Costa, Oliveira, & Lopes, 2017; Specht, Zoll, & Siebert, 2016).

To put it in a nutshell, the overall VF innovation is still scarcely developed and investigated. Certain questions have been left unanswered which address uncertainties about economic viability. They might also include technological questions and those concerning public acceptance Furthermore; VF innovation has never been examined to focus on the innovation process itself from a social-science perspective (Specht, Zoll, et al., 2016; Yang & Campbell, 2017). It was hypothesized that some features related to VF could lead to the rejection of projects within the innovation process. In the majority of cases, it is not first clear whether the society will accept the project or not. This society includes local actors or other stakeholders. This implies that the emergence of innovative products, techniques, and procedures in VF potentially has a specific risk for those who want to develop, investor implement it. So far, no research addressed the factors contributing to the acceptance or rejection of VF. The present research hopes to fill this gap and contribute to a better awareness of VF. Selective issues have been included in the literature that attests to the potential problems in the innovation procedure. Moreover, critics worry about health risks of food polluted by air pollution or irrigation with polluted wastewater.

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The overall view of VF as not ‘‘real agriculture’’ can also negatively influence its practical performance and diffusion (Specht, Siebert, & Thomaier, 2016) In the North of the globe, the matter of agriculture inside and above urban buildings has recently started to attract copious attention and has been more and more discussed and investigated in cities in Canada and the U.S (Ackerman, 2012). 73 worldwide VF projects were investigated by Thomaier et al., and showed that VF has managed to offer innovative practices that may help to sustainable urban development (Thomaier et al., 2015). In addition to producing food, it yields several non-food and non-market goods. It provides new chances for resource efficiency, new agricultural technologies, particular implementation processes and networks, new forms of food production and new city spaces (Specht et al., 2015).

2. LITERATURE REVIEW

Public acceptance (PA) is described as a positive attitude towards a matter at a particular point of time which is stated in a specific idea or in a particular behavior including encouragement, confirmation, and approbation”(Cohen, Reichl, & Schmidthaler, 2014; Kraeusel & Möst, 2012). public acceptance means that a particular policy or a concrete measure is overtly or covertly supported by people who can be influenced positively or negatively. Broadly speaking, public acceptance is one form of attitude that looks into people’s interest or resistance to novelties.

According to Wüstenhagen et al. (2007), there exist three interdependent aspects of public acceptance of renewable energy technological novelty, i.e. socio-political acceptance (including acceptance of technologies and encouraging policies by people, stakeholders, and policymakers) deals with accepting decisions about the institutional framework; this framework can in turn create desirable conditions or stop the acceptance in the other two aspects, community acceptance (linked with procedural justice, distributional justice, and trust) as well as market acceptance (truly associated with investors in facilities, prices/tariffs, intra-firm) (Wüstenhagen, Wolsink, & Bürer, 2007). These three aspects emphasize different dimensions of public acceptance from different actors' perspective, e.g., public, policy-makers local authorities, developers and local people (Cohen et al., 2014; Khorsand, Kormos, MacDonald, & Crawford, 2015; van Rijnsoever, van Mossel, & Broecks, 2015; Williams, 2014; Wolsink, 2012; Yuan, Zuo, & Huisingh, 2015) and in case we intend to look into public acceptance, these three dimensions need to be taken into account altogether. These three, occasionally interdependent types of public acceptance are investigated in this particular issue. Different factors together create public acceptance, for instance, if a technology desires to be successful, market acceptance is not enough i.e. socio-political as well as community acceptance are also required (van Rijnsoever et al., 2015). For more understanding these three aspects first the importance of public acceptance study as a general and then the importance of three dimensions of public acceptance are explained separately.

2.1. The Importance of Public Acceptance Study

Firey (1960) maintained that resource policies should meet three criteria so as to be successfully implemented: they need to be ecological understanding, economically possible and culturally appropriate. Recently, it has been publicly accepted that many factors together are involved in a successful growth of new ideas in the realm of sustainable development (Specht, Zoll, et al., 2016). Even though a great deal of research and managerial action have been taken with regard to the first two criteria, less attention has focused on an understanding the factors that develop cultural adaptability or public acceptability (Firey, 1960; Howe et al., 2005). As a result, Takahashi & Sato's research (2015) argue the public acceptance is a key issue in considering the sustainability of anthropogenic systems. Prospective development depends on a balance among public acceptance, economic feasibility and environmental impact(Takahashi & Sato, 2015). In other words, public acceptance is supposed to be viewed as a key part of social sustainability in a life-long evaluation of sustainability of renewed progress (Yuan et al., 2015) Acceptance study incorporates a wide range of subjects and cannot be applied to one field e.g. sociology or psychology (Schenk, Hunziker, & Kienast, 2007).

What motivated the present work was the fact that economic and environmental assessment alone may not be adequate to address people's expectations. Many obstacles to performing projects successfully once implemented can be regarded as a sign of a lacking public acceptance (Wüstenhagen et al., 2007). In the view suggested, lack of acceptance can also be viewed as no integration and an absence of sustainability in the technical progress and introduction procedure. Afterwards again, developing acceptance contributes to citizen participation while they grow while applying and introducing the new method of creating and using new innovation (Schweizer-Ries, 2008). The advent of technologies or anything new should be accompanied by citizens' and decision-makers' reception so as to become sustainable and to use technology at the same time not only for technical but also for societal development (Schweizer-Ries, 2008; van Rijnsoever & Farla, 2014).

A key factor that affects the success/failure of landscape protection method is public acceptance (Schenk et al., 2007). As reminded by Luz (2000), free from the ever-changing framework and political circumstances of landscape planning, social criteria for a planning program could be considered as `determinants of local acceptance as well as reliability. From the early to mid-1990s, the body of research in Germany addressed social and behavioral matters that concerned landscape ecology and planning with the goal of improving acceptance and implementation. This research along with other newer studies show how lacking communication among scientists, planners, administrators and local stakeholders impede acceptance and performance of landscape planning projects. In recent years, protecting nature and landscape ecological projects have entered the field of research on political sciences which led to success in implementation. Landscape planning activities should not only begin with the physical facts of an area but also consider the social condition of people affected by the planning. Eventually, as a rule, landscape planning goals can just be accomplished with the help of local people

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and stakeholders. Implementing of the ecological concepts result from more social-ecological systems. Evidently, if social and emotional factors are not intermingled with landscape ecology, nature conservation besides landscape planning; just half of the duty is accomplished (Luz, 2000).

2.1.1. The Importance of Community Acceptance of Vertical Farming

Community acceptance happens at the local level and is affected by shared costs and benefits and those involved in the decision-making process (Peters, 2015). We describe citizen acceptance as behavioral reactions to situations where people are faced with the positioning of a technological object in or near one's home, which is decided, handled or owned by others (Wolsink, 2012).

Ellis (2012) recognized that, at present, just one to two percent of the food produced in America is local. 'Local' generally implies the involvement of the public. This is comparatively small since about 70 percent of the world's population reside in cities. It is essential for cities to produce food for themselves as their participation makes involved in the change. More participation on the part of the public means a greater feeling of possession and they will work actively to see the farm success. In turn, this helps the program get expanded and attract public's interest in this new agriculture movement in cities (Ellis, 2012).

Besthorn (2013) believe that the public acceptability with a focus on strengths-based methods in practice can be used in urban areas to decide what strengths and resources residents already have can be used in implementing a V.F project. For instance, through holding focus groups with those living in a neighborhood, planners of the vertical farm project may discover that dwellers like to access foods that developers had not taken into account. As a vertical farm is capable of growing almost any kind of fruit or vegetable, the farm could be planned to consider the local food tastes of each neighborhood. Many residents might be seen to find it hard to prepare healthy food. One thing that motivates people using fast food is that it is warm and can be prepared quickly. It also requires less effort. Planners might find that residents of a particular site need on-site or restaurants nearby that sell healthy, organically-grown food. A vertical farm can have an on-site restaurant to serve people near them to fully access fresh and healthy food that fits local tastes or holds classes on facile preparation of healthy and organically-grown foods (Besthorn, 2013) Although evidently subordinate in a larger economy, VF stands for a case of the aforementioned social and environmental changes that may be accommodated by dominant interests, maintain the main constituents, and/or adopt new forms.

2.1.2. The Importance of socio-Political Acceptance of Vertical Farming

According to the Neerdael's definition (2007), political acceptance means that a particular policy or concrete measure is passively or actively supported by the political system of a country. Clear examples of political organizations are national laws and government regulations as well as elected representatives locally over a

wide range of political organizations (Neerdael, 2007). Socio-political acceptance also involves acceptance by main stakeholders and policymakers, who can use different strategies to affect socio-political acceptance.

As envisioned by Abel (2010) the concerning politics and funding again, politicians should accept the fact that technological developments will substitute the present technologies. The agricultural industry is worth billions of dollars. The vertical farm industry deserves hundreds of billions of dollars as you can do without subsidies and as you don't just count profit. You also count the work produced by constructing and maintaining these farms (Abel, 2010). The world is evidently moving towards a new, biological age in which VF plays a significant role. Food systems are investigated more and have become more politicized, particularly for those challenging for social justice (Miller, 2011).

According to Specht et.al (2015) in an investigation in Berlin, stakeholders find in the political setting that V.F can be simply incorporated into the existing policies. They recognize synergies with Berlin's political and planning strategies. A city counselor characterizes V.F as ''highly consistent with urban development strategies that emphasize the idea of productive urban landscapes''. V.F abides by rather than contrasts with global mainstream strategies (Specht, Siebert, et al., 2016).

As a conclusion, further development of VF can be supported through formalizing government support, facilitating the incorporation of urban farming into the cityscape, including urban farming within city policies and planning; and developing (commercial) VF as part of a novel urban green economy and system. Attention should be paid to the potential costs and risks and thorough impact assessments should be done. "High-rise food-producing building" should be strong, government-supported economic incentives to the private sector, as well as to universities and local government to extend the concept.

2.1.3. The Importance of Market Acceptance of Vertical Farming

Market acceptance considers the role of consumers as adopter who can be a person but can also be a company or any other kind of agent capable of adopting the technology. Goods or services that manage to meet adequate market demands are most likely maintained. They get 'distributed' among the population while others are not (van Rijnsoever et al., 2015).More generally, in market acceptance, the emphasis is not only on consumers. In case investors allow for an investment chance or accept a financial product, it implies they are eager to economically engage in a perceptible asset or imperceptible asset in return for a financial gain.

Designing a VF in a city is one way to support local and ecologically produced food market. However, they are also described as "complicated, politically-sensitive and engaging many partners". They often have the problem of the negative project performance, i.e. they overrun budgets and fall behind the timing. Such points have significant consequences for construction companies and other stakeholders such as project initiators, de-

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velopers or investors. Negative project performance can, for example, be a function of underestimated costs or establishment of "disorganized or underdeveloped governance plans" (Sanderson, 2012).

Other critical problems include high investment costs, exclusionary impact, and a shortage of acceptance. Especially in developed countries, awareness of ''food system'' or ''food system planning'' is linked with more than just food safety. It further involves personal and social requirements (e.g., trust and transparency, justice, resilience) (Specht et al., 2014).

As a result, the issue of how megaproject stakeholders, both generally and concerning the case of VF projects is raised to address this uncertainty in decision-making. Investor's acceptance is significant since the main stakeholders are financial supporters without whom no projects could exist. In conclusion, investor's point of view on the evaluation of governmental support systems can help to underpin distribution patterns and potentials.

3. RESEARCH METHOD

As the nature of research in public acceptance concept is difficult to be confined to specific disciplines and also can be seen from different disciplinary perspectives, the relevant materials are scattered across various journals. Wind energy, renewable energy nuclear energy, carbon capture and storage technology are the most common academic discipline for public acceptance research. A qualitative approach was chosen in this study, for analyzing and assessing the importance of the role of the public acceptance in VF as a new innovation. So, this study contains theories and material according to a transdisciplinary and multidisciplinary method to cover. The following online journal databases were selected to search for a comprehensive literature review on public acceptance theory and VF: Google Scholar, Science Direct, ProQuest, Web of Science, as well as Scopus from the recent year from 2007 to 2017. The study resources were formed from different source types such as journals, conference papers, theses, books, and websites.

The literature search was conducted based on the words "public acceptance", "vertical farming" and "food security" which produced results as follows:

1. Each of the selected articles was reviewed and referring to the proposed framework. First, the articles are selected from the keyword "public acceptance". The article was not related or far from the topic, was excluded. In this part, the research was focused on the dimensions of public acceptance and the data were classified based on the public acceptance's dimensions.
2. In the same time, the articles are selected with the keyword "Vertical Farming". After this step, all the retained articles will be further selected for the topics content ''VF in relation to food security". The full text of each article was reviewed to remove those that were not actually related to VF in urban areas.

3. As mentioned before, there are not study related to the public acceptance of VF. Then, the papers found were reviewed to see how public acceptance affected VF as a new innovation in relation to food security. The detailed steps are following by Fig.1.

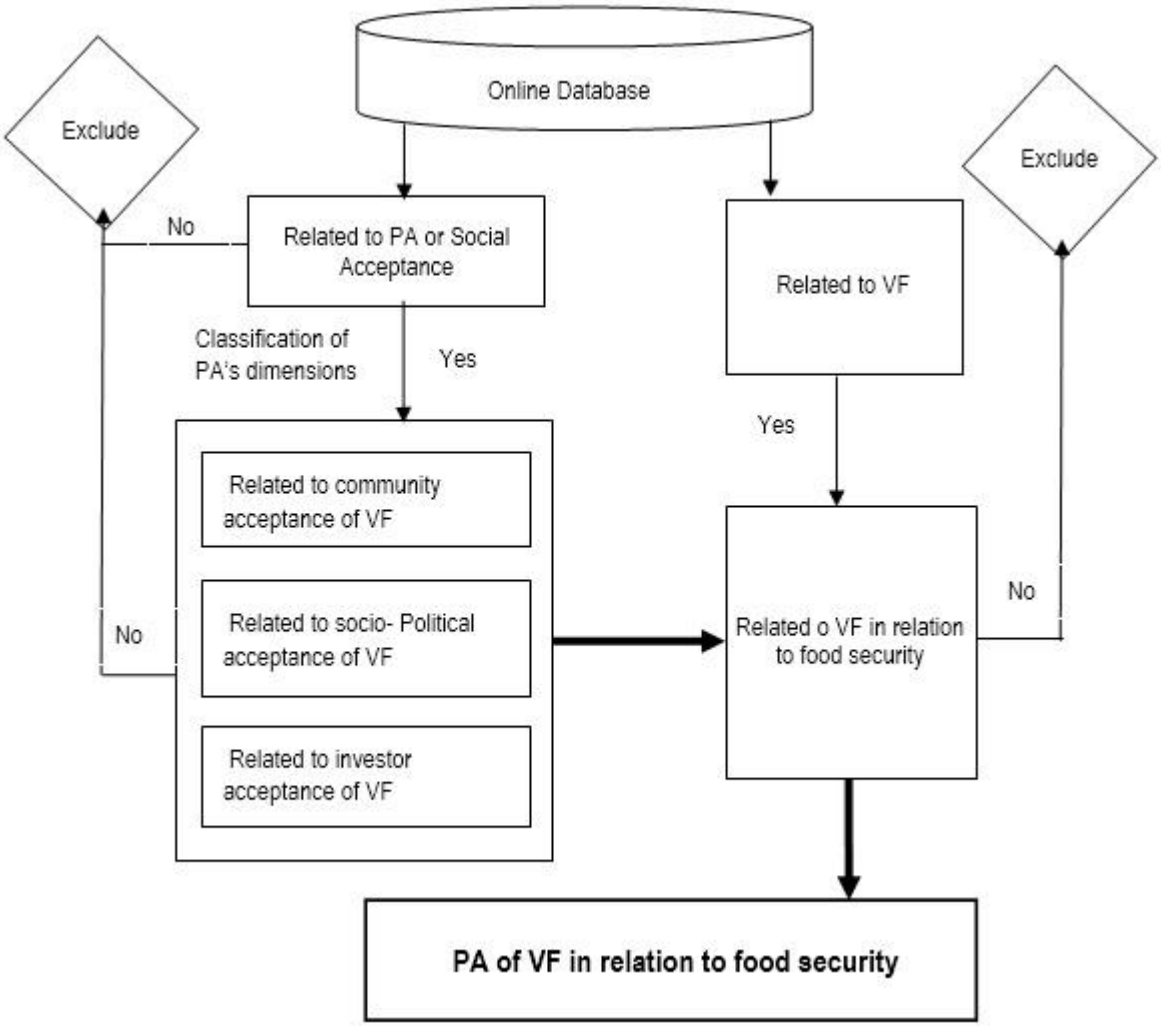

FIGURE 1 - RESEARCH PROCESS

4. DISCUSSIONS

Devine-Wright's research (2007) are indicated that public acceptability is a necessary condition for technology advancement and distribution but it leads to a lot of questions about the mental procedures that shape public responses (including cognitive views, feelings and behavioural responses) on the manner in which public reactions are made and responded to by main stakeholders including local government, industry and the beneficiaries as well as the consequences it has for patterns of prospective public acceptability. Although

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research has a key role in critical analysis, insight, and assessment of this field it affects practice and policy-making (Devine-Wright, 2007).

Up to now, no prior research has addressed nor reported on VF emergence and innovation process as perceived by a stakeholder (Specht et al., 2015). VF overall perception and public acceptance is a key precondition needed for its success/failure within the innovation procedure. Recognizing and getting aware of the identified acceptance factors is needed for practitioners and potential operators, as well as researchers, lobbyists or policymakers who desire to look into, introduce or develop VF projects (Specht, Siebert, et al., 2016).

If seen from an environmental/psychological perspective, technological advancement is not viewed as separate from people. Rather, it is viewed as a socio-technical system approach in which technological progress and people are affecting each other and making progress collaboratively (Shamshiri et al., 2018). If these objectives are combined, the approach helps to global food safety, and we can make sure that international sustainability criteria of environmental compatibility and public acceptability are met (Germer et al., 2011).

However, it is evident that in a society where science is growing more and more reliable to the public, the public view should be considered so as to make the innovation process lawful (van Rijnsoever & Farla, 2014). Moreover, through social practice reflected the transactional language of the environment, the emphasis was basically clinical, and the environment just dealt with the social aspect of human life. From a greater environmental view, this limited view of environment hindered a holistic reaction to destroying ecological systems. Human health should be considered to have its roots in social experience and social understanding. Therefore, it is necessary to see how the occupational view of person-in-environment has started to be formed. Although social work has for long aimed to base its theory and practice in an ecological model, it was just in the latter part of the 20th century that the occupation started to consider that a holistic awareness of person-in-environment required a concern for the natural environment. In the previous decade, many social workers worldwide have defended the value of integrating environmental awareness into the job's theoretical patterns and practice. Little attention was paid to the main problem of food unsafety and the real need for sustainable agricultural attempts. Missing awareness of food security, hardship of critically evaluating social work's indulgence in modern optimism for an everlasting growth and infinite material utilitarianism, failure to define food safety as a social work, and the difficulty of capturing the limited access to safe and nutritious food as a matter of social justice and key human rights especially with regard to the disaster of marginalised classes of people (Besthorn, 2013; Kaiser, 2011).

5. CONCLUSIONS

Such environmental benefits cannot still be understood without governmental and institutional commitment, together with public acceptance and cooperation. Therefore, public acceptance is the main factor involved in

forming the role VF will play in solving the global food security problem in future. The probability of success in enacting a sustainable, urban farming innovation through the use of vertical farms would be to a great extent fostered with the cooperation of social practice. Public acceptability has not ever been alone involved in evaluation, intervention, and solution of individual mental problems. In fact, the profession is not a single unit but is instead described by the growth of several lines of both theory and practice. As regards both theory and practice, public acceptability is in a unique status to take into account several interdependent dimensions that that aim to serve individuals and communities in their unique socio-cultural settings. Public perception will be a key factor predicting the success of a project. Seeking for public participation in the operation of the project helps people to become part of the food center. In turn, this involvement will contribute to the program and motivates public's acceptance of this novel agricultural movement in cities.

Such an acceptance will be a catalyst for creating a new life and bringing back order and discipline to cities with the help of food systems. How VF Is perceived can improve provided that projects make a sensible use of its positive capabilities. Moreover, acceptance showed to be more positive in case VF projects utilized a discreet design method, went for an otherwise unused (rooftop) space or deserted building, and if they were economically independent (Specht, Siebert, et al., 2016).

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