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Sustainable Development of Water Housing Using the Example of Poland: An Analysis of Scenarios

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Abstract: At the turn of the 20th and 21st centuries, Polish cities began the process of returning to live by water. There is a growing interest in water reservoirs not only as places for recreation, but also as new areas suitable for living, at the very center of the city. Unfortunately, due to the lack of appropriate legal regulations, the dynamic development of floating homes (FHs) is starting to raise increasing concerns in Poland. Regardless of the potential direction of development in water construction in Poland (growth, stabilization, or regression), the question arises of "how to make the potential vision of the future of water construction in Poland consistent with the idea of sustainable development (SD)". In order to try to answer this question, the authors of this publication indicate the future limitations of formulating a strategy for the development of houses on water in Poland, according to different domains of SD. These domains are the economic, socio-cultural, and environmental spheres. Using the states of surrounding scenarios method (SSSs for short), we developed future scenarios for FHs (an optimistic scenario, a pessimistic scenario, a surprise scenario, and the most probable scenario). Then, using five inferential methods, we defined the constraints that should be taken into account when strategizing for water construction in accordance with the values of SD.

Keywords: states of the surrounding scenarios; floating homes; sustainable development; economic factors; socio-cultural factors; technical factors

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1. Introduction

As a result of the progress of civilization, dynamic changes in the socio-economic space are observed that are not always in accordance with sustainability principles. A general trend is the emergence and development of municipal space. Even outside of cities, the socio-economic space consists of a mosaic of various regions (ecosystems or socio-economic areas) that constitute territorial units closely linked to municipal areas. The transfer of people, goods, and information between cities and regions constitutes the key determinant of constant anthropogenic changes in the socio-economic space [1], including water areas, such as water construction, a new phenomenon in Poland [2].

2. Definitions and Aim of Sustainability

The idea of sustainable development is aptly expressed in a sentence from the Report of the World Commission on Environment and Development from 1987 about our common future: "Sustainable development is a development in which the needs of the present generation can be met without compromising the chances of future generations to meet them" [3].

Therefore, more integrated measures are needed in the economic, social, and environmental fields. Sustainable development is an intergenerational solidarity in finding solutions that guarantee further growth, and allow for the active inclusion of the development of all social groups, while giving them the opportunity to benefit from economic growth.

Initially, discussions regarding sustainable development were limited to the need to reduce the negative impact of economies on the natural environment. Over the years, this concept has gained a fuller definition that aligns the key features of the three factors of development: respect for the environment, social progress, and economic growth [4]. This can be represented by Figure 1.

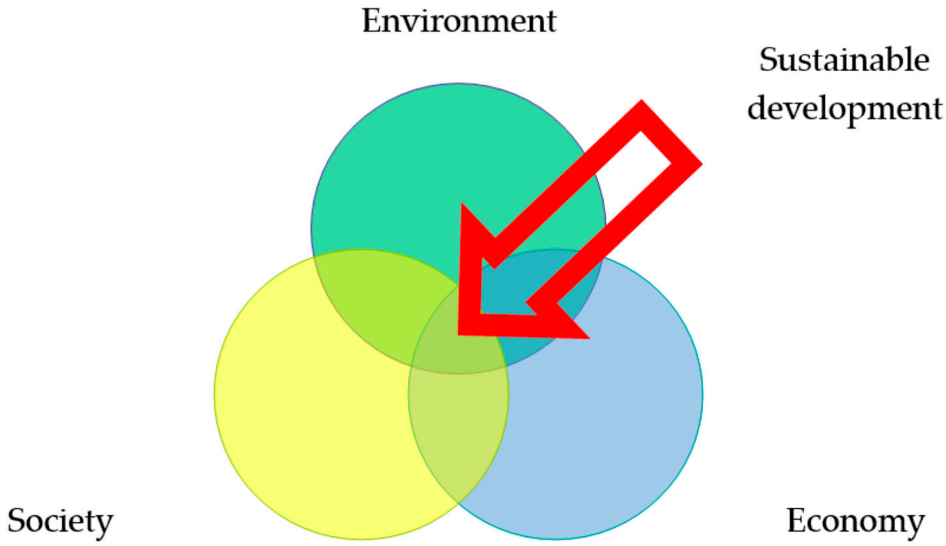

Figure 1. Graphical representation of the concept of SD (based on ref. [2,5]).

Currently, the concept of sustainable development is increasingly entering mainstream discussions about socio-economic development, becoming a horizontal principle that is reflected in all the development policies of a country [4].

Although the essence of the concept of SD is sufficiently clear, the precise interpretation and definition of SD have provoked lively discussions [6,7]. A diversity of concepts, and a wide spectrum of SD goals, have been the subjects of scientific research [6–20]. An additional area of scientific research is the implementation of sustainable development goals by individual countries [21–32].

In Poland, the principle of sustainable development has been given the rank of a fundamental right, resulting from the provisions of the Constitution of the Republic of Poland. Article 5 of the Basic Law says: "The Republic of Poland guards the independence and inviolability of its territory, ensures the freedoms and rights of humans and citizens, and the security of citizens, guards the national heritage and ensures protection of the environment, guided by the principle of sustainable development" [4,33].

Water construction is included in SD Goal 11 of the United Nations 2030 Agenda, which is: "Make cities and human settlements safe, stable, sustainable and inclusive" [3]. A research gap can be found in the issue of water construction in the context of achieving sustainable goals. The authors of this paper did not find any studies in this area. This publication is an attempt to address this topic, using the example of Poland. Because, in Poland, water construction is still a relatively new issue with an unclear future, the scenario method was used, to present a potential picture of the future of houses on water.

3. Materials and Methods

3.1. Methodology of Conducting Studies Using SSSs

Adopting a single picture of the future is unrealistic. When looking towards the future, the patterns of the presently identifiable factors shaping the environment will themselves be affected by ongoing and future events. This causes many alternative images of the future to emerge. The options for the development of the present into alternative states for the future can be represented using the concept of a funnel for possible scenarios (Figure 2).

The width of the funnel increases with greater degrees of uncertainty, and longer forecast periods [34,35].

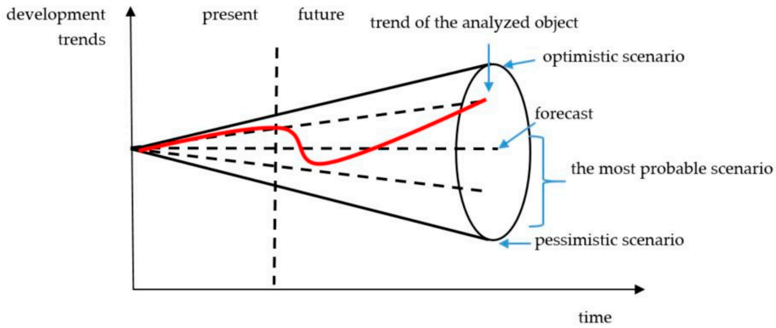

Figure 2. The system of states of surrounding scenarios in the sustainable development of construction on water (based on ref. [34]).

Our procedure for conducting studies connected with the development of FHs, following the methodologies of the works [35–38], is composed of four stages:

1. First Stage

The environmental, socio-cultural, and economic factors that have a decisive impact on the development of FHs are identified.

2. Second Stage

The phenomena distinguished in the previous step are assessed, in two dimensions:

- the strength of the influence of a given factor on the development of FHs (the strength of the impact is measured in accordance with the ten-point scale adopted in the methodology, which is presented in Table 1); and
- the probabilities of three characteristic tendencies of process change (the sum of these probabilities must equal 1).

Table 1. The strength of the impact of the factor influencing the future scenario: a 10-point scale (own study, based on [36–38]).

The Strength of a Negative Impact					The Strength of a Positive Impact				
−5 Very high	−4 High	−3 Moderate	−2 Low	−1 Very low	+1 Very low	+2 Low	+3 Moderate	+4 High	+5 Very high

The tendency to change should be understood as assigning one of three potential trends to each factor:

- an upward trend in the process in the future: the potential negative or positive impact of the trend, and the likelihood of its occurrence;
- a stabilization tendency in the process in the future: the potential negative or positive impact of the trend, and the likelihood of its occurrence; or
- a downward trend in the process in the future: the potential negative or positive impact of the trend, and the likelihood of its occurrence.

3. Third Stage—The trends are arranged according to particular scenarios:
    - optimistic, based on the factors that have the most positive influence (disregarded in this study);
    - pessimistic, based on the factors that have the most negative influence (disregarded in this study);
    - the surprise scenario, taking into account the factors that are the least likely to take place; or

- the most probable scenario, based on the factors that are most likely to take place, irrespective of the positive or negative impacts.

4. Fourth Stage—The results are analysed, presented graphically, and summarised, and conclusions are drawn, according to five inferential methods [34,35]:
   - stormy surroundings;
   - the evaluation of environmental heterogeneity;
   - the neutralization of threats;
   - the leading processes; and
   - early warning systems [35–38].

3.2. Identification of the Factors Influencing the Development of FHs

In our analysis, the environmental factors aggregated in groups of factors (also known as spheres) relevant to the subject matter of the study are called determinants. The environment is understood to constitute the overall processes, phenomena, and institutions influencing the subject of the research [37,38]. In the study of future scenarios for sustainable housing developments on water, there are three essential spheres: economic, socio-cultural, and environmental. We identified groups of factors based on a review of the literature, expert interviews, and our own studies.

Once the environmental processes relevant to the research topic were identified, they were evaluated by experts (those with professional experience on the subject under consideration) in terms of impact force, course of action, and the likelihood of their occurrence.

Afterwards, a commercial spreadsheet was applied for the three possible trends, to calculate the probability value, and assess the impact force, of each factor. The values for each sphere are listed in:

- Table 2 for the economic sphere;
- Table 3 for the socio-cultural sphere; and
- Table 4 for the environmental sphere.

Table 2. Experts' final responses regarding the impact strength of, and their determination of the likelihood of, individual economic factor trends concerning the future of FHs—the overview of the results. Own study.

Factors/Trends In	**Trends**	**Strength of Impact from −5 to +5**	**Probability**
1.1. Rent costs (maintenance of the facility)	Growth	+2	0.44
	Stagnation	+1	0.41
	Regression	−1	0.15
	Sum		1.00
1.2. FH insurance	Growth	+1	0.31
	Stagnation	0 (−1) *	0.49
	Regression	−1	0.20
	Sum		1.00
1.3. City center real estate prices	Growth	+3	0.50
	Stagnation	+1	0.42
	Regression	−2	0.08
	Sum		1.00
1.4. Mortgages for construction or purchase of FHs	Growth	0 (+1) *	0.26
	Stagnation	0 (−1) *	0.55
	Regression	−1	0.19
	Sum		1.00

Table 2. *Cont.*

Factors/Trends In	Trends	Strength of Impact from −5 to +5	Probability
1.5. Technical inspection costs of FHs	Growth	−1	0.22
	Stagnation	0 (−1) *	0.54
	Regression	+1	0.24
	Sum		1.00
1.6. Increasing affluence of society	Growth	+4	0.46
	Stagnation	+2	0.40
	Regression	−2	0.14
	Sum		1.00

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

Table 3. Experts' final responses regarding the impact strength of, and their determination of the likelihood of, individual socio-cultural factor trends concerning the future of FHs—the overview of the results. Own study.

Factors/Trends In	Trends	Strength of Impact from −5 to +5	Probability
2.1. Contact with nature	Growth	+3	0.46
	Stagnation	+1	0.42
	Regression	−2	0.12
	Sum		1.00
2.2. Fashion	Growth	+2	0.45
	Stagnation	+2	0.40
	Regression	−1	0.15
	Sum		1.00
2.3. A way to spend free time	Growth	+3	0.50
	Stagnation	+2	0.39
	Regression	−1	0.11
	Sum		1.00
2.4. Sense of freedom	Growth	+2	0.41
	Stagnation	+1	0.48
	Regression	−1	0.11
	Sum		1.00
2.5. Convictions and beliefs	Growth	+1	0.14
	Stagnation	+1	0.68
	Regression	−1	0.18
	Sum		1.00
2.6. The construction industry	Growth	+3	0.44
	Stagnation	+1	0.46
	Regression	−1	0.10
	Sum		1.00
2.7. Sense of prestige	Growth	+2	0.47
	Stagnation	+2	0.42
	Regression	−1	0.11
	Sum		1.00

Table 4. Experts' final responses regarding the impact strength of, and their determination of the likelihood of, individual environmental factor trends concerning the future of FHs—the overview of the results. Own study.

Factors/Trends In	Trends	Strength of Impact from −5 to +5	Probability
3.1. Revitalization of urban areas	Growth	+3	0.37
	Stagnation	+1	0.47
	Regression	−2	0.16
	Sum		1.00
3.2. Monitoring the aquatic environment	Growth	+3	0.28
	Stagnation	+1	0.58
	Regression	−1	0.14
	Sum		1.00
3.3. Uncontrolled expansion	Growth	−3	0.37
	Stagnation	0 (−1) *	0.42
	Regression	+2	0.21
	Sum		1.00
3.4. Eco-friendly solutions	Growth	+4	0.49
	Stagnation	+1	0.39
	Regression	−2	0.12
	Sum		1.00
3.5. Alternatives to land drainage	Growth	+3	0.30
	Stagnation	0 (+1) *	0.56
	Regression	−2	0.14
	Sum		1.00
3.6. Rising sea and ocean levels	Growth	+3	0.35
	Stagnation	+1	0.53
	Regression	−1	0.12
	Sum		1.00
3.7. Rapid change in groundwater levels	Growth	+3	0.38
	Stagnation	0 (−1) *	0.47
	Regression	−2	0.15
	Sum		1.00
3.8. Hydrological drought	Growth	−2	0.17
	Stagnation	+1	0.54
	Regression	+2	0.29
	Sum		1.00
3.9. Surface water resources	Growth	+2	0.33
	Stagnation	+1	0.52
	Regression	0 (−1) *	0.15
	Sum		1.00
3.10. Land protection by relocating towns to water	Growth	+2	0.21
	Stagnation	+1	0.61
	Regression	−1	0.18
	Sum		1.00

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

4. Results

The determination of probability value, and the assessment of impact strength are necessary in order to construct each of four possible future scenarios.

We constructed the optimistic scenario by selecting the factors with the highest, most positive assessments of impact strength, and calculating their arithmetic means from the appropriate rows of Tables 2–4. The results are presented in Table 5.

Table 5. Building a scenario for the future—the optimistic variant (own study).

Factors/Trends in the Surroundings	Strength of Impact from −5 to +5	Factors/Trends in the Surroundings	Strength of Impact from −5 to +5	Factors/Trends in the Surroundings	Strength of Impact from −5 to +5
1.1. Rent costs (maintenance of the facility)	+2	2.1. Contact with nature	+3	3.1. Revitalization of urban areas	+3
1.2. FH insurance	+1	2.2. Fashion	+2	3.2. Monitoring the aquatic environment	+3
1.3. City center real estate prices	+3	2.3. A way to spend free time	+3	3.3. Uncontrolled expansion	+2
1.4. Mortgages for construction or purchase of FHs	0 (+1) *	2.4. Sense of freedom	+2	3.4. Eco-friendly solutions	+4
1.5. Technical inspection costs of FHs	+1	2.5. Convictions and beliefs	+1	3.5. Alternatives to land drainage	+3
1.6. Increasing affluence of society	+4	2.6. The construction industry	+3	3.6. Rising sea and ocean levels	+3
		2.7. Sense of prestige	+2	3.7. Rapid change in groundwater levels	+3
				3.8. Hydrological drought	+2
				3.9. Surface water resources	+2
				3.10. Land protection by relocating towns to water	+2
Strength of influence	+2.0	Strength of influence	+2.3	Strength of influence	+2.7

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

Likewise, a pessimistic scenario was constructed, in which the factors with the lowest, most negative assessments of impact strength were selected from Tables 2–4, and their arithmetic means were calculated. The results are presented in Table 6.

The most probable scenario consists of the trends that are most likely to occur (from Tables 2–4), regardless of their potential positive or negative impact [32]; these results are presented in Table 7.

Table 6. Building a scenario for the future—the pessimistic variant (own study).

Factors/Trends in the Surroundings	The Strength of the Impact of −5 to +5	Factors/Trends in the Surroundings	The Strength of the Impact of −5 to +5	Factors/Trends in the Surroundings	The Strength of the Impact of −5 to +5
1.1. Rent costs (maintenance of the facility)	−1	2.1. Contact with nature	−2	3.1. Revitalization of urban areas	−2
1.2. FH insurance	−1	2.2. Fashion	−1	3.2. Monitoring the aquatic environment	−1
1.3. City center real estate prices	−2	2.3. A way to spend free time	−1	3.3. Uncontrolled expansion	−3
1.4. Mortgages for construction or purchase of FHs	−1	2.4. Sense of freedom	−1	3.4. Eco-friendly solutions	−2
1.5. Technical inspection costs of FHs	−1	2.5. Convictions and beliefs	−1	3.5. Alternatives to land drainage	−2
1.6. Increasing affluence of society	−2	2.6. The construction industry	−1	3.6. Rising sea and ocean levels	−1
		2.7. Sense of prestige	−1	3.7. Rapid change in groundwater levels	−2
				3.8. Hydrological drought	−2
				3.9. Surface water resources	0 (−1) *
				3.10. Land protection by relocating towns to water	−1
Strength of influence	−1.3	Strength of influence	−1.1	Strength of influence	−1.7

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

In contrast, the surprise scenario includes the trends (from Tables 2–4) that are the least likely to occur, regardless of their potential positive or negative impact [32]; these results are presented in Table 8.

Table 7. Building a scenario for the future—the most probable variant (own study).

Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability	Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability	Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability
1.1. Rent costs (maintenance of the facility)		+2	0.44	2.1. Contact with nature		+3	0.46	3.1. Revitalization of urban areas		+1	0.47
1.2. FH insurance	0 (−1) *		0.49	2.2. Fashion		+2	0.45	3.2. Monitoring the aquatic environment		+1	0.58
1.3. City center real estate prices		+3	0.50	2.3. A way to spend free time		+3	0.50	3.3. Uncontrolled expansion	0 (−1) *		0.42
1.4. Mortgages for construction or purchase of FHs	0 (−1) *		0.55	2.4. Sense of freedom		+1	0.48	3.4. Eco-friendly solutions		+4	0.49
1.5. Technical inspection costs of FHs	0 (−1) *		0.54	2.5. Convictions and beliefs		+1	0.68	3.5. Alternatives to land drainage		0 (+1) *	0.56
1.6. Increasing affluence of society		+4	0.46	2.6. The construction industry		+1	0.46	3.6. Rising sea and ocean levels		+1	0.53
				2.7. Sense of prestige		+2	0.47	3.7. Rapid change in groundwater levels	0 (−1) *		0.47
								3.8. Hydrological drought		+1	0.54
								3.9. Surface water resources		+1	0.52
								3.10. Land protection by relocating towns to water		+1	0.61
Medium strength of influence	−1.0	+3.0		Medium strength of influence		+1.9		Medium strength of influence	−1.0	+1.1	

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

Table 8. Building a scenario for the future—the surprise variant (own study).

Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability	Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability	Factors/Trends in the Surroundings	The Strength of a Negative Impact	The Strength of a Positive Impact	Probability
1.1. Rent costs (maintenance of the facility)	−1		0.15	2.1. Contact with nature	−2		0.12	3.1. Revitalization of urban areas	−2		0.16
1.2. FH insurance	−1		0.20	2.2. Fashion	−1		0.15	3.2. Monitoring the aquatic environment	−1		0.14
1.3. City center real estate prices	−2		0.08	2.3. A way to spend free time	−1		0.11	3.3. Uncontrolled expansion		+2	0.21
1.4. Mortgages for construction or purchase of FH	−1		0.19	2.4. Sense of freedom	−1		0.11	3.4. Eco-friendly solutions	−2		0.13
1.5. Technical inspection costs of FHs	−1		0.22	2.5. Convictions and beliefs		+1	0.14	3.5. Alternatives to land drainage	−2		0.14
1.6. Increasing affluence of society	−2		0.14	2.6. The construction industry	−1		0.10	3.6. Rising sea and ocean levels	−1		0.12
				2.7. Sense of prestige	−1		0.11	3.7. Rapid change in groundwater levels	−2		0.15
								3.8. Hydrological drought	−2		0.17
								3.9. Surface water resources	0 (−1) *		0.15
								3.10. Land protection by relocating towns to water	−1		0.18
Medium strength of influence	−1.3			Medium strength of influence	−1.2	+1.0		Medium strength of influence	−1.6	+2.0	

*: in accordance with rounding rules, the calculated result of the arithmetic mean of the impact m_{aR} is 0, because the 10-point scale of the impact assessment does not contain a neutral 0 value. The value in brackets indicates the positive or negative value obtained before rounding the result.

5. Discussion

The study of these four optimistic, pessimistic, surprise, and most probable SSSs provides an opportunity to explore the future limitations in strategy formulation for the SD of construction on water. A graphical presentation provides a quick and relatively easy evaluation of the environment, based on five inferential methods (Figures 3–5):

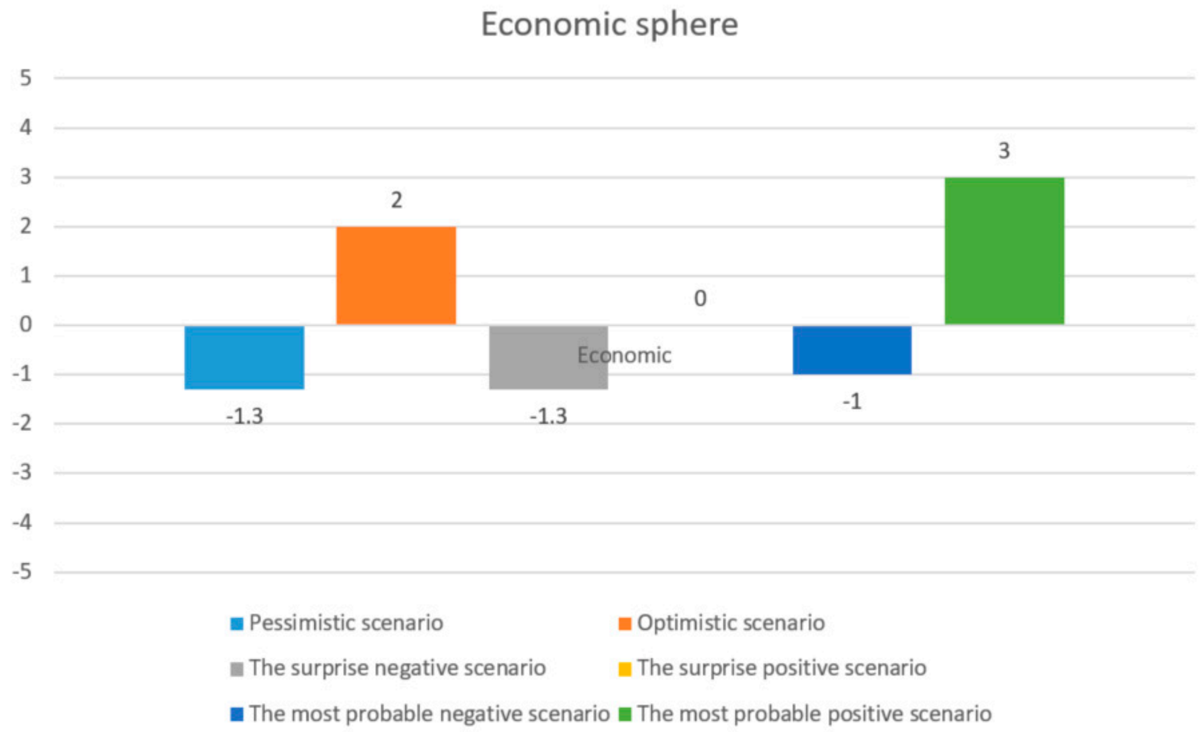

Figure 3. The SSSs in the economic sphere of the SD of FHs (own study).

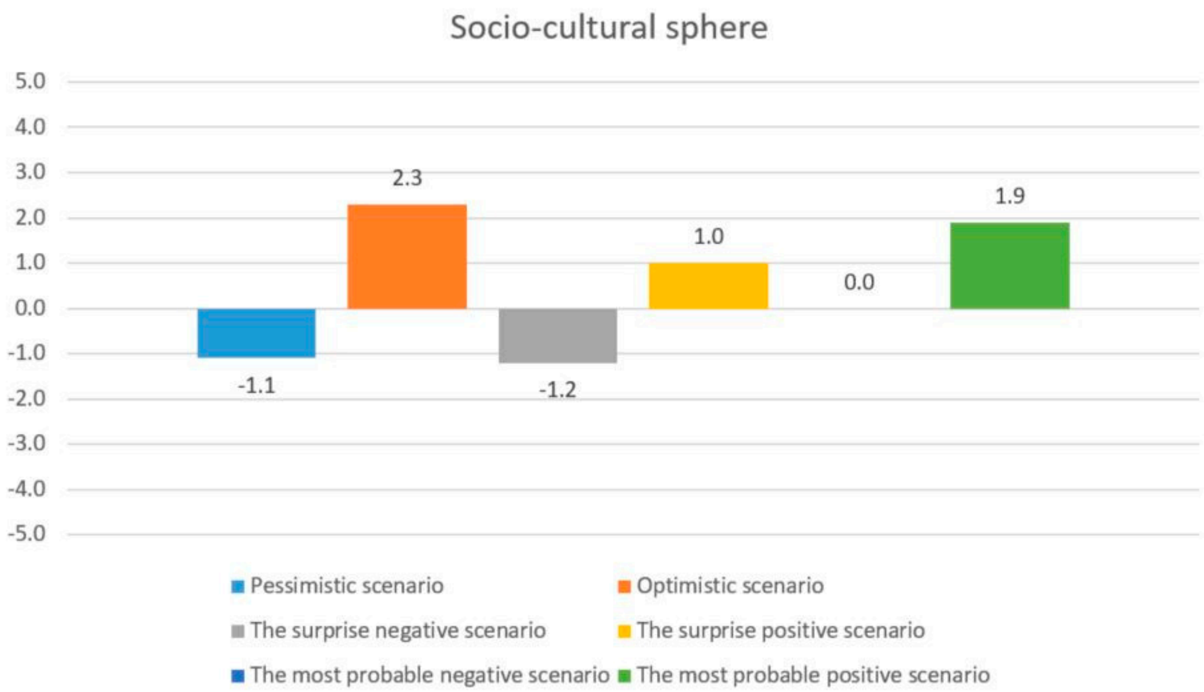

Figure 4. The SSSs in the socio-cultural sphere of the SD of FHs (own study).

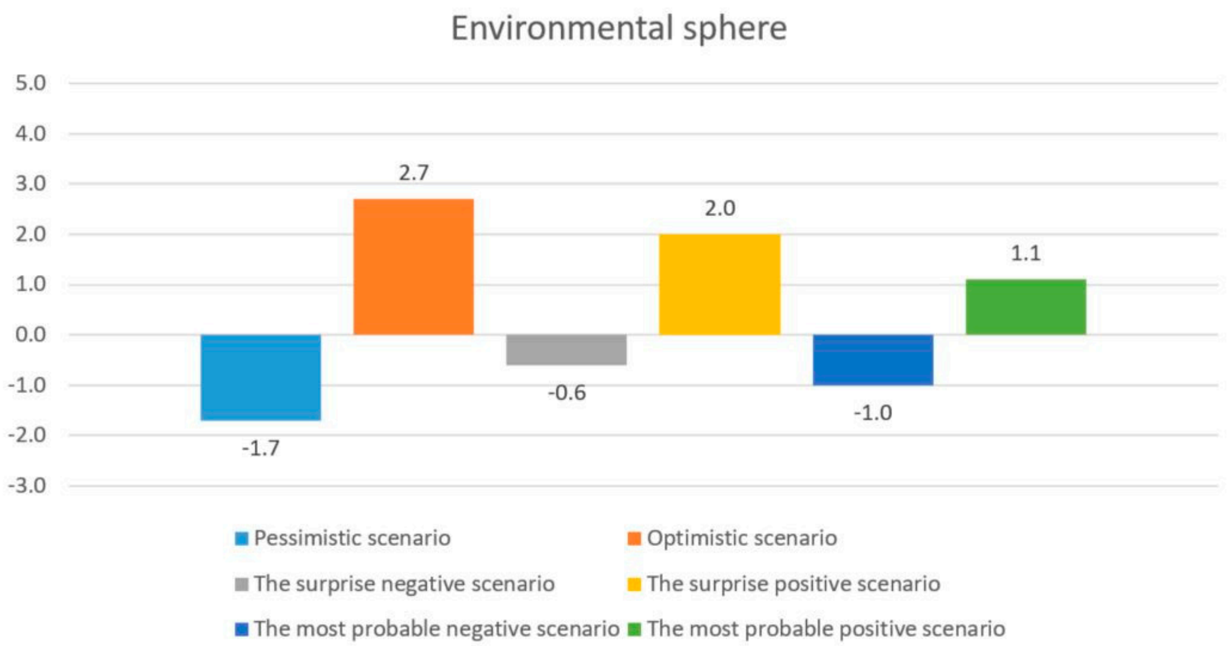

Figure 5. The SSSs in the environmental sphere of the SD of FHs (own study).

5.1. Stormy Surroundings

The environmental turbulence, and the degree of dependence of the study subject on this turbulence, can be assessed by analyzing the disparity between the optimistic and pessimistic scenarios in particular spheres. The greater this disparity, the stronger the dependence of the study subject on its surroundings (based on ref. [36]).

5.2. Evaluation of Environmental Heterogeneity

A derivative of the first inferential method, the second method involves analyzing the value spread of the most probable scenario across particular spheres. The greater the value spread, the more heterogeneous, and less structured, the environment [36].

5.3. Neutralization of Threats

In an environment, the dominant factors are indicated as positive (opportunities) or negative (threats). While constructing a strategy, in the parts of the environment where opportunities prevail, projects aimed at their exploitation should be considered. Where threats prevail, the strategy ought to center measures aimed at neutralizing them (based on ref. [36]).

5.4. The Leading Processes of Threats

The most probable scenario allows for the extraction of lead processes; that is, processes that have a strong influence on the study subject, both positively and negatively [1]. The factors are selected by indicating those that not only have a high probability of occurrence, but also exert a strong influence on the study subject (a high positive or low negative value of impact) (based on ref. [36]).

5.5. Early Warning Systems

The analysis of the surprise scenario serves as a starting point in the development of early warning systems. These are created by selecting the factors with the strongest influence on the study subject, whether positive or negative, but with a low probability of occurrence (based on ref. [36]).

6. Conclusions

A summary of the average impact values of the SD scenarios regarding construction on water is shown in Table 9. This summary is represented graphically in Figures 3–5, for easier interpretation. Further interpretation is outlined from 5.1 to 5.5, in accordance with the above-mentioned five inferential methods.

Table 9. The mean influence force values of the individual SD scenarios regarding construction on water—the overview (own study).

Sphere	Scenario					
	Pessimistic	Optimistic	Surprise		Most Probable	
			Negative	Positive	Negative	Positive
Economic	−1.3	2.0	−1.3	0.0	−1.0	3.0
Socio-cultural	−1.1	2.3	−1.2	1.0	0.0	1.9
Environmental	−1.7	2.7	−0.6	2.0	−1.0	1.1

6.1. Stormy Surroundings

The SD of water-based construction is most dependent on changes in the environmental sphere. This is indicated by the largest difference in the average impact value between the optimistic scenario, with a value of 2.7, and the pessimistic scenario, with a value of −1.7, amounting to 4.4. The strategy for this situation ought to be based on the positive and powerful factor "3.4. Eco-friendly solutions", and particular attention should be paid to limiting the occurrence possibility of the factor "3.3 Uncontrollable expansion", with a −3.0 impact value.

6.2. Evaluation of Environmental Heterogeneity

The sphere with the greatest difference in the mean impact values for the most probable scenario is the economic sphere. In comparison to the socio-cultural sphere, with a difference of 1.9, and the environmental sphere, with a difference of 2.1; as the positive value of the economic environment is 3.0, and the negative value is −1.0, its difference is 4.0.

This heterogeneous and poorly structured sphere requires a focus on the positive aspects resulting from the occurrence of the factor "1.3. City center real estate prices", which has a positive impact of +3.

In addition, a detailed analysis is needed, to prevent the occurrence of the factors "1.2. Insurance of FH", "1.4. Mortgage for construction or purchase of FH", and "1.5. Technical inspections costs of FH", of 0 (+1) impact value. The heterogeneity of this sphere is interpreted as an increasing interest from investors in FHs located in urban centers, with simultaneous concerns about insurance and credit issues, as well as FH technical inspection costs.

6.3. Neutralization of Threats

In order, the spheres with the highest mean values in the surprise scenario are the environmental (average impact of +2), socio-cultural (average impact of +1), and economic (average impact of 0). A strategy aimed at maximizing the benefits of the opportunities offered by the environmental sphere will promote the SD of construction on water. Opportunities are seen in the factor "3.3. Uncontrollable expansion", which can be interpreted as a rapid increase in investors' interest to provide broad development opportunities for sustainable construction on water.

However, the sphere containing the lowest impact value for individual factors, amounting to −1.3, is the economic sphere. The SD of water-based construction should be focused on measures to neutralize the risks arising from the factors "1.3. City center real estate prices" and "1.6. Increasing affluence in society", causing slower growth or inhibition of the SD of construction on water.

6.4. The Leading Processes of Threats

The factors with the highest probability and highest positive impact are:

- "1.3. City center real estate prices", with a 50% probability, and an impact of +3, in the economic sphere;
- "2.3. A way to spend free time", with a 50% probability, and an impact of +3, in the socio-cultural sphere; and
- "3.4. Eco-friendly solutions", with a 49% probability, and an impact of +4, in the environmental sphere.

The high prices of real estate in city centers will increase investors' interest in building on water. These facilities will also serve leisure and recreational purposes outside of their residential function, due to their proximity to the water. This behavior increases environmental awareness, which is a clear advantage of modern residential facilities on water.

These trends should be considered in terms of their positive impact on the future prospects of the SD of construction on water, and their high probability of occurrence. It is important that these factors represent each sphere, and negative values were characterized by a low impact strength and/or low probability. They are a key element in the design and implementation elements of a strategy.

6.5. Early Warning Systems

The factors with the lowest probability and highest negative impact are:

- "1.3. City center real estate prices", with an 8% probability, and an impact of −2, in the economic sphere;
- "2.1. Contact with nature", with a 12% probability, and an impact of −2, in the socio-cultural sphere; and
- "3.4. Eco-friendly solutions", with a 13% probability, and a negative impact, in the environmental sphere.

The re-occurrence of the factors "1.3. City center real estate prices" and "3.4. Eco-friendly solutions" points to their dominant role in building the SD strategy for construction on water. A suppression of increases in land-based property prices, and a lack of implementation of eco-friendly solutions in FHs would have a negative effect on the development of this phenomenon. This is, however, as unlikely to happen as the lack of contact between humans and nature.

The future of construction on water presented in the above guidelines for building a development strategy to meet SD Target 11.1 only partially implements its assumptions. Though FHs are definitely cheaper than housing on land, building on water is only a way to stop the process of gentrification in waterside city centers, not to provide a place to live for the poorest social class.

The development of construction on water in Poland must be included in an appropriate legal framework, to ensure the sustainable urbanization of areas above and on water. Currently, this is a factor inhibiting the popularity of this type of construction and, in turn, SDG Target 11.3.

The implementation of SDG Target 11.5 using FH is definitely an asset to this type of housing. An example of a situation where people lost their lives and property due to bad official decisions is the flood of 1997, which took place in Wrocław; this flood was known as the flood of the millennium. If traditional houses had not been built in flood-prone areas, only floating houses, a large number of people could have been saved, and their houses would not have been destroyed.

A big advantage of FHs is their ecological character, which is why the development of construction on water is part of the implementation of SDG Target 11.6.

The partial transfer of the city to the water could protect green or reclaimed areas from development, and preserve them as a space for recreation, which is in line with SDG Target 11.7.

Building on water largely fits into the sustainable development of cities, and even supports it, through ecological solutions and an increased resistance to flooding and rising sea and ocean levels. However, this is not a solution that ensures proper living conditions for people from the lowest social class. There is a high risk that slums would move from land to water.

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