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Original Article

Futures of Iranian Children and Teenagers Engagement in Cyberspace

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Abstract
This study seeks to identify and describe believable and probable scenarios about the future engagement of children in cyberspace from the perspective of futures studies. Children's and adolescents' access to the Internet and network-based technologies is becoming increasingly prevalent. So explaining the key factors and uncertainties affecting this phenomenon requires a comprehensive insight into current and emerging trends and the change drivers. For this purpose, after reviewing several useful technological and social trends, using scenario-based planning methodology, questionnaire tools and expert panel, 28 effective factors, ten key factors, and five driver forces (with uncertainty) were identified. Then, structural analysis and scenario logic explanations have been performed by Micmac, Scenario wizards, and cross-impact matrix analysis. Accordingly, the four scenarios of "salmon in the pool", "salmon in the river", "guppy in the tank", and "goldfish in the pond" have been identified and narrated for the future of Iranian children's engagement in cyberspace. The findings of this study provide a more comprehensive understanding of believable futures while emphasizing the importance of engaging and addressing the interests of audiences and the needs of stakeholders in designing relevant strategies and broadening the horizons of decision-makers toward future alternatives.

Keywords: children, cyberspace, future, scenario planning, teenagers.

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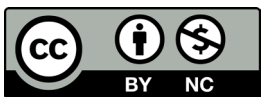

Introduction

The Internet has become a vital tool for social participation more than ever, and children's opportunities in today and the future world have significantly been affected by Internet access. The realization of new skills, new communication facilities, and in particular, access to information and online services has become so important that many national governments have formally recognized the right of access to the Internet as human rights (De Hert & Kloza, 2012). Along the way, Technological developments are intertwined with unprecedented and rapid social change: high-speed Internet, broadband, and a dramatic increase in mobile Internet penetration (about 99% in OECD countries) (OECD, 2018).

New technologies have made fundamental changes in 21st-century children's' life as the primary users of emerging online and digital services (Chaudron et al., 2018). Information and communication technologies are widespread within families, and social media, impact children's attitude, time and personality (OECD, 2018). Digital platforms have become a part of the natural process of children's development at an early age. As a result, the cyberspace (and the media and entertainment industry) is increasingly influencing our activities related to growth, learning, play, and interactions with our children (AAP, 2016). However, issues such as security, reliability, and children's support in online and digital technologies are considered globally, and creating effective strategies in this area requires an active (rather than passive) approach.

In Iran, the use of computers and digital technologies occupies a significant part of children's leisure time (Nekoufar & Ghalavand, 2018). Despite the benefits of cyberspace and related technologies (including learning, collaboration, and interaction), there is also potential, and real dangers for children in cyberspace requires to be addressed and participated by all stakeholders (Bawden & Robinson, 2009). In fact, cyberspace should be primarily viewed from both perspectives of opportunities and threats, and this is an accepted and pursued attitude in many countries around the world.

The results of studies have shown that cyberspace policymakers in the country, especially for children and adolescents (0-16 years), face various challenges in the formulation of appropriate and sustained strategies to cope with the emerging changes and intrinsic complexities of children's engagement in cyberspace (AzariJahromi, 2018). The future of children's engagement in cyberspace is affected by key factors and uncertainties. Any strategy

formulation and decision-making requires a comprehensive insight into current and emerging trends and change drivers and achieving a comprehensive understanding of alternatives (Probable and possible future scenarios and images). Therefore, the theoretical approach of futures studies has been selected for this research to explore alternative options in the form of consistent scenarios in the field of the research.

Accordingly, the present study has attempted to identify critical trends and emerging technologies in this area. Then, in addition to identifying the driving forces and uncertainties affecting children's engagement in cyberspace, the consistent (more possible) scenarios of future children's engagement are identified and described on the horizon of 15 years. This horizon, is not so close that the expectation of significant changes seems unlikely and at the same time, is not so far as to make it hard to imagine. Accordingly, a horizon of 15 years was considered appropriate in the expert panel. Furthermore, the relationships between the key factors (in terms of influence/dependence) is analyzed. Finally, strategic recommendations to prepare for the upcoming changes and also to give direction to the changes is presented.

Research Background

One of every three Internet users in the world is a child; in the past few years, the number of Internet users aged 0 to 8 has increased dramatically. New technological tools, including touch screens and icon-based tablets, have accelerated the trend of younger Internet users. For example, 78% of children aged 3-4 in the Netherlands and 70% of children aged 3-4 in Sweden and Belgium have online access (OECD, 2018). The online engagement of children is highly correlated with their parents' online time and the number of digital devices they access at home (Children in a Digital World, 2017).

Digital device ownership age (including smartphones) has decreased (UNICEF, 2017). 42% of children aged 0 to 8 years in the United States owned a tablet in 2015. A global survey by the World Children's Center has shown that, on average, 80% of children have access to the Internet via mobile or tablet (Byrne & Burton, 2017). In China, 64% of children below 10 have mobile Internet access. However, about 50% of children can access the Internet in their private room with less parental supervision (OECD, 2018). Similarly, lowering the age of online access among children can also raise concerns as younger people are more vulnerable to the dangers they may face in cyberspace.

Among teens, access to apps, videos, and content on virtual forums and social networks has also been recognized as a personal and private activity (Choi, 2018).

Another study among OECD countries showed that 73% of students were active in social networks on a daily basis, 63% had daily online chat, and 34% spent time on online games. Also, 88% of students stated that the Internet had been their primary source of information and informal learning (OECD, 2017).

On the other hand, in 2018, the entertainment and media industry accounts for 2.52% of total GDP; in recent years, leisure-based businesses and emerging technologies has played a prominent role in global economic relations and is expected to become more and more complex over next years. Also, the cultural, social, and political impacts of the media on public opinion have an undeniable potential for directing future changes and are known to have essential functions in perceiving indexes such as security, prosperity and participation (PwC, 2017).

However, emerging social trends, such as younger audiences and the decline of online access age, the recognition of the Internet as a right and an indicator of well-being, and the diversification of user experience through cyberspace, require constant monitoring of changes and inclusive efforts to create added value for a broader range of younger audiences and their families (OECD, 2018). In this regard, the entertainment and media industry has undergone significant changes in the world. Actors of entertainment and media industries have, in recent years, pursued a variety of engaging and deeply distributed contents in a creative, simple, and inexpensive way in the lived experience of users (Brown & Pecora, 2014).

Currently, cyberspace actors, are focusing on creating the most attractive, engaging, and convincing experience for users and audiences; it is the primary goal of growth and investment strategies, especially in child-related areas including learning, entertainment, and leisure. On this path, using the technological capabilities is central in these efforts (PwC, 2017). Technology, inevitably, is inextricably bound up with developments in cyberspace.

The Global Media and Technology Industry Outlook 2017 report lists eight of the critical emerging technologies in media and entertainment are almost all based on cyberspace development. Recognizing these emerging technologies is a precondition for designing and developing any image for the future of children's presence in cyberspace.

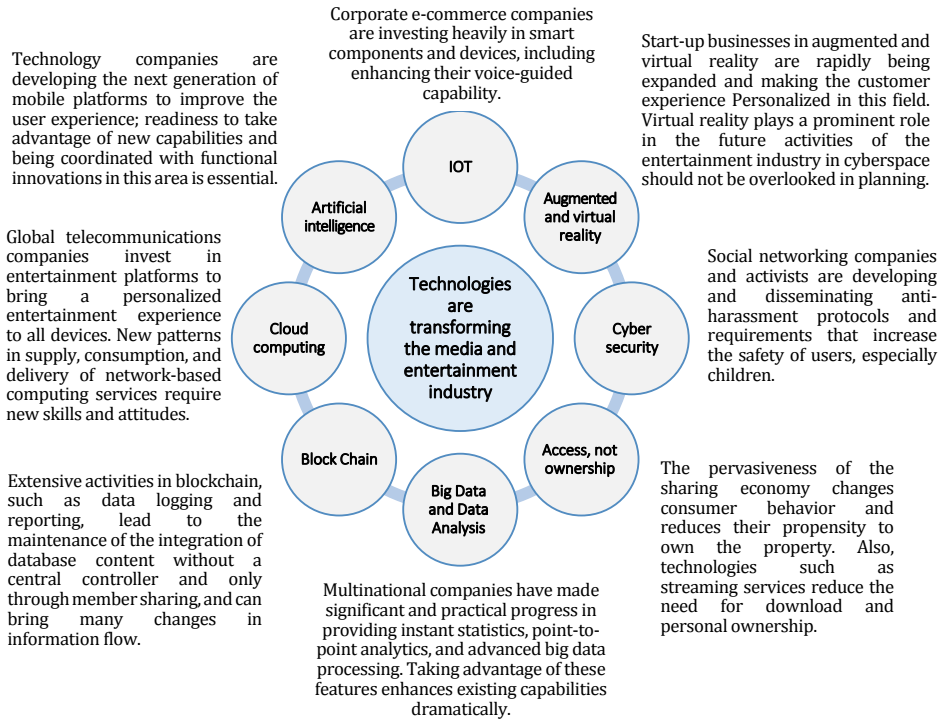

Figure 1. Emerging technologies in media and entertainment

Thus, it is clear that emerging technological trends, also economic, social, political, and cultural trends, greatly influence the future of children's engagement. Some of these trends and factors are of greater importance (impact) and uncertainty (unpredictability). In general, the rapid and unpredictable rate of global change drastically increases future uncertainties, and more uncertainties mean the possibility of more varied alternatives (Banister & Hickman, 2013); In a Scenario-based foresight, these trends and factors, play a crucial role in establishing alternative futures.

Research Method

Futures studies seek to understand the differences and the origins of different images of the future (Dator, 2009) as can be said, the ultimate achievement of all futures studies methods is the scenario. The scenario is often a story of possible alternatives for the future, alternatives that may vary in different circumstances (Bell, 2004). In other words, the scenario is a believable descriptive of what might happen and how to appear during current events and trends (Glenn & Gordon, 2009). The

primary function of the scenario is to create a space for future probability. Overall, scenario-developing techniques are broadly inclined to cultivate general perspectives on the status of a system in the future (Hickford et al., 2014).

Typical approaches to scenario development are a mixture of quantitative, qualitative, and participatory approaches, based on the views of experts or stakeholders. At the same time, explanatory scenario development is an excellent approach to present alternatives and probable images of the future. It is a way to understand better the opportunities and threats leading up in the research field.

In this study, mixed methodology in scenario development has been used and findings are from the integration of qualitative techniques (including "expert panels" and "interviews") and quantitative/ qualitative research techniques (including "cross-impact analysis", "Scenario Wizard Software" and "Micmac Software").

For this purpose, by adopting an exploratory approach to scenario planning, at first, the list of effective factors is obtained through literature review and interviews. After that it is finalized through expert panel and key factors are realized. Then, by distributing the importance and uncertainty questionnaire among the experts, the factors of higher importance and uncertainty are identified as the main driving forces in the research topic.

This questionnaire evaluates each of the key factors separately according to the importance index on the one hand and the uncertainty index on the other hand. The "importance" index indicates the impact of each factor in the future of the research topic. "Uncertainty" index refers to the degree of unpredictability and ambiguity about the occurrence of certain trends or events.

In summary, key factors are important variants present in the surroundings environment and can play significant role in forming future options. Driving forces are powerful forces with high potential to create great changes (Glenn & Gordon, 2009). Furthermore, Uncertainty is necessarily an essential element in the study of the future. It stems from the fact that in the present we are unable to tell exactly which of the possible alternative futures will come to pass (Novaky & Safranyne, 2018).

Sampling of experts was based on qualitative method among professors, managers, futurists or specialists who are well known in the related areas or scientific community and are known as an expert in the research issue (cyberspace). Due to the qualitative nature of the research method, a Snowball sampling method was used to find the experts. Accordingly, the questionnaire was sent to 33 experts

and finally, 18 responses received from target community. The number of contributors, by the distinction of expertise, is shown in Figure 2. The expert panel and interviews were also arranged and conducted among Respondents group including seven key experts (2 ICT engineers and one expert from each of the other disciplines mentioned in Figure 2).

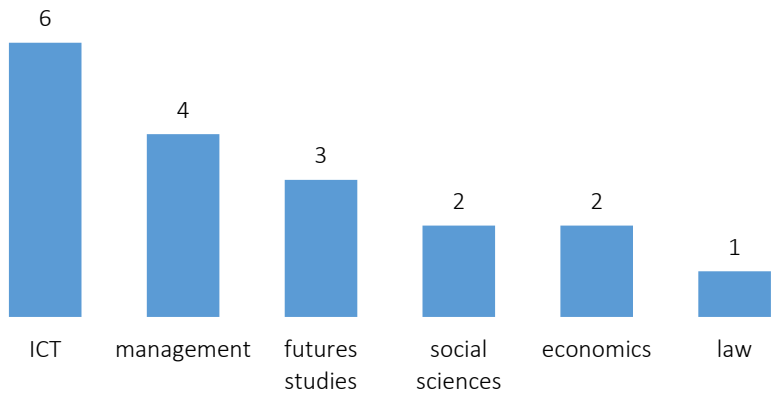

Figure 2. Demographic analysis of experts

The logic of the scenarios in this research, according to traditional scenario based planning model (Schwartz, 1992), is to identify the main driving forces and uncertainties building the future of Iranian children and teenagers activity in cyberspace. In this regard, Micmac and scenario wizard software are used in interdisciplinary research to process qualitative information and turn experts' qualitative perspectives into quantitative data. The basis of these software is based on cross-impact analysis matrix. The Micmac, helps to measure the interactive effects of the key factors on each other and provides a map of the influence/dependence of the factors. The scenario wizard, measures the effect of each uncertainty on other uncertainties and based on statistical calculations, determines the consistent scenarios for the system.

So, based on the cross-impact analysis method, questionnaires were designed to measure the relationships between the variables under study and were provided to the research experts. (Data gathering for scenario Wizard software and Micmac software done in the form of designing and completing separate questionnaires); thus, by quantifying the experts' qualitative insights, the necessary input is provided to the relevant software.

The Scenario Wizards software extracts and presents logical scenarios with higher or relative compatibility based on the made

settings. The output of this software illustrates each of the possible (consistent) scenarios in the research topic. The Micmac software also draws a picture of interrelationships between critical factors and their intensity and provides a map of influences and dependence. It transforms the interactive pattern of reactions into a technique for explanatory analysis providing a clear image of which trends are effective or dependent (or both).

Accordingly, the output scenarios of the Scenario Wizard software, along with the additional information obtained from the Micmac software, are analyzed in the Expert Panel. Finally, the descriptive narrative of each scenario, using expert qualitative perspectives and in terms of key research factors is developed. The inherent difference between scenarios stems from differences in their uncertainties. The validity of the outputs is measured by referring to expert opinions. The methodological process can be seen in Figure 3 and it is described in details, in the process of explaining the findings of the article.

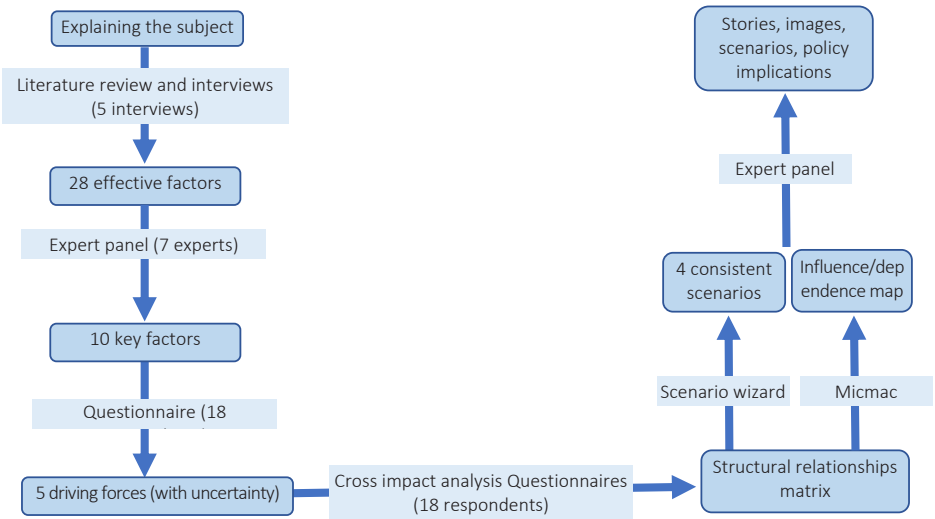

Figure 3. The methodological process of the research

Findings

Determining the main driving forces and uncertainties

Identification of effective factors done through a literature review and also five semi-structured interviews with activists and experts on the subject. Identification of 28 effective factors of children's future engagement in cyberspace is the output of this process (Table 1).

Table 1. Twenty eight effective factors on the future of children engagement in cyberspace

1	Family and child access to cyberspace	15	The relativism of values
2	Cyberspace literacy level	16	Increasing public awareness and knowledge
3	Equipment, bandwidth and cost of services	17	Change in social intelligence
4	Filter rate and level	18	Virtual identity in the future
5	Per capita household income	19	The role of government structures
6	Attractiveness and ease of access to new technologies	20	AI-based information technology
7	Cyber security and threats	21	Changes in the tastes of the new generations
8	The educational role of parents	22	Expanding Cultural Diversity (Globalization)
9	Decreased trust between families	23	Trying to regulate cyberspace
10	The breakdown of social relations	24	Reduction in biological and natural resources
11	Global individualism	25	The amount of investment in cyberspace technologies
12	The growth of non-governmental organizations	26	Technical constraints and infrastructural problems of the country
13	Digitization	27	The economic stability of children's cyberspace
14	Reduction in the cost of producing and delivering services and content	28	The mental picture of families of their children's progress

These 28 factors were presented to the panel of research experts, including managers and professional audiences of cyberspace from different disciplines. Ten key factors were identified in this process. Experts rated factors on two criteria: the importance and the uncertainty (The meaning and difference of which were explained in the previous section). Evaluation of results, the importance and uncertainty of the factors are summarized in Table 1. Accordingly, five driving forces with higher relative importance and uncertainty have been identified.

Table 2. Identification of the driving forces in terms of the importance and uncertainty of key factors

Row	Factors	Importance	Uncertainty	Multiply points
1	Level of family and child access to cyberspace	9.7	5.5	53.35
2	Level of Cyber literacy	8.5	4.5	38.25
3	Families' mental image of their children's development	9.1	6.9	62.79
4	The amount of investment in cyberspace technologies in Iran and the world	9	6.2	55.8
5	The extent to which governments and institutions attempt to regulate cyberspace	7.8	7.8	60.84
6	The state of individualism and globalization in the world	8.3	4.3	35.69
7	Household income per capita	8.1	7.7	62.37
8	A drastic change in the tastes of new generations and a change in lifestyle	8.8	5.2	45.76
9	Digitization and virtualization of affairs	8.6	5	43
10	Attractiveness and ease of work and access to new technologies	9.4	4.4	41.36

Figure 4 also depicts the mean of importance score and the uncertainty of the identified key factors (Higher rated scores are

highlighted). As can be seen, both by the multiply or the sum of significance and uncertainty criteria, the same five factors with higher scores rated as drivers.

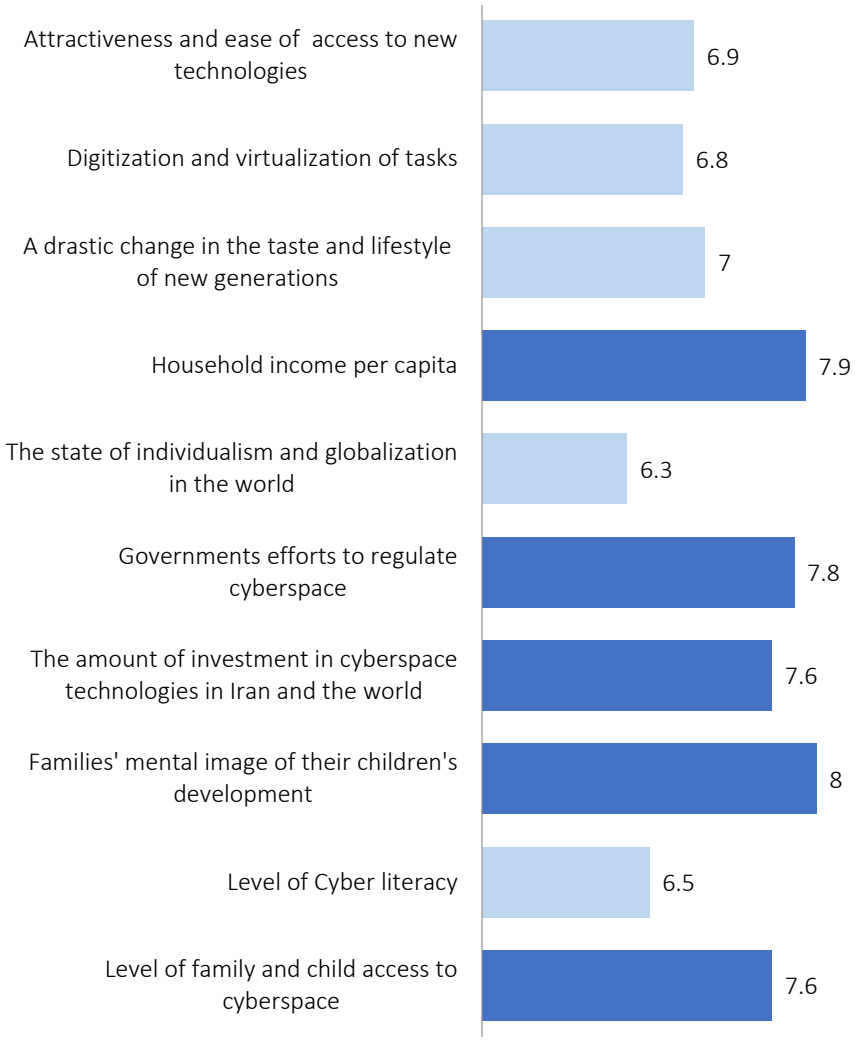

Figure 4. Evaluation of the key factors in terms of importance rating mean and uncertainty

Finally, Figure 5 shows the distribution of key factors in terms of two dimensions of importance (rows) and uncertainties (columns) in a two-dimensional coordinate diagram (selected proportions in the dashed area). As can be seen, all three tested ways, lead to the same results about critical drivers.

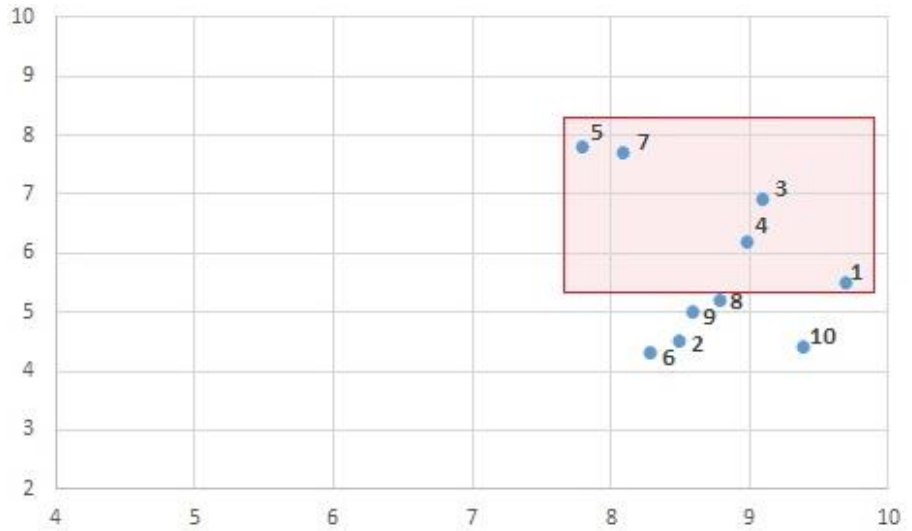

Figure 5. Distribution graph of key factors in terms of importance and uncertainty

Based on this findings, five factors identified and selected as main driving forces illustrated in Figure 6.

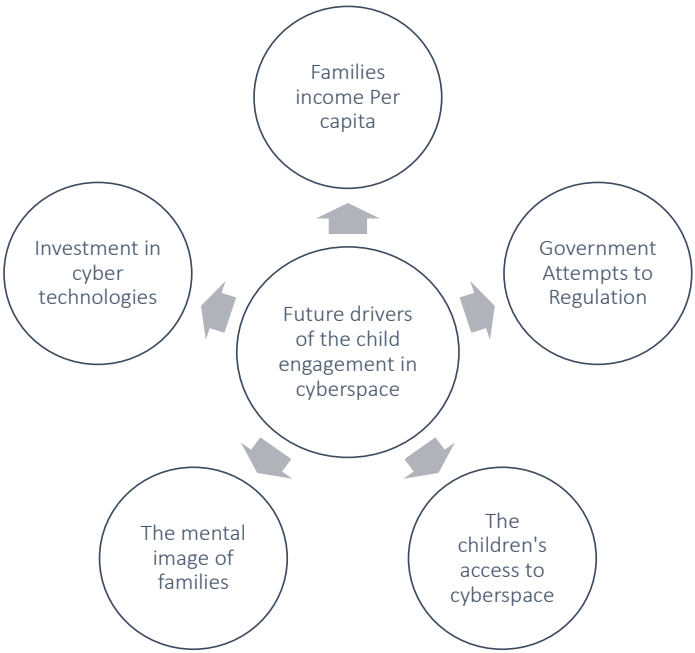

Figure 6. Drivers (with uncertainty) affecting children's future engagement in cyberspace

Each identified driver has two or three states (uncertainties) that will be used in scenario analysis. There are two "drivers" that have two "uncertainties" and the other three drivers each have three "uncertainties" (Table 3).

Table 3. Uncertainties associated with each of the drivers

Row	Driving forces	Uncertainties
1	Family income per capita in the next 10 years	Better Worse Intermediate
2	Families' mental image of their children's development over the next 10 years	The Internet is literacy Believe in traditional literacy Internet is the agent of diverting children
3	The extent to which the government is attempting to regulate cyberspace over the next 10 years	To dominate and control Being an observer No effect
4	The amount of investment in cyberspace technologies in Iran over the next 10 years	Increase investment Reduce investment
5	Level of family and child access to cyberspace in the next 10 years	Increase access level Decrease access level

Accordingly, potentially 108 scenarios (i.e., 3 × 3 × 3 × 2 × 2 scenarios) resulting from different modes of uncertainty aggregations are theoretically possible. However, only a few of these theoretical modes can, in the real world, be relatively or strongly compatible. The use of cross impact analysis matrix and scenario wizard software for calculating and explaining relationships makes it possible to determine consistent scenarios.

Analysis of the interaction and determine scenarios

Balanced Cross Impact analysis is a method for analyzing impact networks. One typical use of cross-impact analysis in the futures studies is in scenario analysis. These matrices calculate the direct and indirect effects of the states on each other by eliciting experts' opinions. This matrix of interrelations (between the various uncertainties of the drivers) is, in fact, software input for performing statistical calculations and determining the compatibility of the selected scenarios.

An important issue to consider in this process is the use of an expert approach to collecting, organizing, and judging the relationships between variables (uncertainties). These data were collected and summarized through the distribution of cross impact questionnaires among experts. So, the interdependencies between the main uncertainties, come from the ideas of the experts and are used as input to Scenario Wizard software.

Families income Per capita																						
Better							3	0	-2				-2	1	0				2	-2				2	-2
Intermediate							2	1	-1				-1	1	0				1	-1				1	-1
Worse							-1	2	1				1	1	-1				-1	1				0	0
Families' mental image of their children's development																						
The Internet is literacy	0	0	-1										-2	1	1				3	-2				3	-2
Believe in traditional literacy	0	1	0										0	2	-1				0	-1				1	0
Internet is the agent of diverting	-1	0	0										2	2	-3				-1	0				-2	2
governments efforts to regulate cyberspace																						
To dominate and control	-1	0	1				-2	1	3										-2	2				-2	2
Being an observer	1	1	0				1	2	0										2	-2				0	0
No regulation	1	1	0				2	0	-2										1	-1				2	-2
Investment in cyber technologies																						
Increase investment	1	1	-1				2	0	-2				1	1	0									3	-2
Reduce investment	-1	0	1				-1	1	2				0	-1	0									-1	1
Level of family and child access to cyberspace																						
Increase access level	0	0	0				3	1	-2				-2	0	2				2	-2					
Decrease access level	0	0	1				-2	0	2				2	1	0				-2	2					

Figure 7. Cross impact Analysis between the main uncertainties

Based on these data, the Scenario Wizard software calculates and identifies compatible scenarios and determines which uncertainties of which proponents are statistically most consistent with each other. The software outputs from the highly adaptable scenarios include six scenarios, as described in Table 4.

Table 4. Software output from consistent scenarios

Scenario No. 1	Scenario No. 2	Scenario No. 3	Scenario No. 4	Scenario No. 5	Scenario No. 6
Families income Per capita: Better	Families income Per capita: Intermediate	Families income Per capita: Better	Families income Per capita: Intermediate	Families income Per capita: Worse	
Families' mental image of their children's development: The Internet is literacy				Families' mental image of their children's development: Internet is the agent of diverting	Families' mental image of their children's development: Believe in traditional literacy
governments efforts to regulate cyberspace: Being an observer		governments efforts to regulate cyberspace: No regulation		governments efforts to regulate cyberspace: To dominate and control	governments efforts to regulate cyberspace: Being an observer
Investment in cyber technologies: Increase investment				Investment in cyber technologies: Reduce investment	
Level of family and child access to cyberspace : Increase access level				Level of family and child access to cyberspace : Decrease access level	

A careful examination of the output scenarios in the expert panel reveals that those six software output scenarios can be categorized and summarized into four main scenarios. Editing the final space of the scenarios in the form of the four main scenarios (achieved through the integration of the primary output scenarios) provides more tangible and distinct images of the future. It makes the critical differences between each of the four final scenarios clearly and prominently traceable. Table 5 illustrates the four main scenarios.

Table 5. combination of the six software output scenarios into four main scenarios

Scenarios Uncertainties	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	Scenarios 1 & 2 scenario wizard	Scenarios 3 & 4 scenario wizard	Scenario 5 scenario wizard	Scenario 6 scenario wizard
Family income per capita	Improved or sustained	Improved or sustained	Worse	Worse or sustained
Families' mental image of their children's development	Internet is the literacy	Internet is the literacy	The Internet is a distraction	Believe in traditional literacy
government attempts to regulate cyberspace	Supervision	No effect	Domination and control	Supervision
investment in cyberspace technologies	Increase	Increase	Decrease	Decrease
Level of family and child access to cyberspace	Increase	Increase	Decrease	Decrease

Factor Impact Analysis

A better understanding of a system in future occurs when we examine the relevant system more deeply and understand the effects of the influencing processes. After explaining the scenario space (Table 3), understanding the interrelationships between key factors, their role

in the system development in the future, as well as the intensity and type (effectiveness) of these relationships, can assist researchers in developing more accurate and reasonable scenario story.

In the foresight toolbox, the structural analysis method (based on cross impact matrix) is commonly used in combination with other methods, and the Micmac software has been recognized as a complement to scenario planning in many studies. Using this tool, the relationship between important trends and key factors in the field of study (future of children's engagement in cyberspace) is analyzed.

Generally, software output matrices and diagrams are of two types: one is the map of influence/ dependence relationships between key variables, and the other is a graph of direct/indirect influence among variables.

The key variables are in one of the main positions of "influential (or driver)", "bi-directional (or risk or mediating)", "dependent (or resultant)" and "independent (or non-influential)" variables. The variables position in the graph indicates their status in the system and their role in dynamics and future developments of the system. Although, there is more detailed segmentation for the separation of variables, the present study is limited to the four categories of output variables in order to maintain the transparency of the findings. Also, according to the panel of experts, the same ten key factors identified in the interview and expert panel process were identified as the main factors and trends for entry into the Micmac software. Out of a total of 90 evaluated relationships, ten relationships have zero value (no impact), 19 relationships value 1 (low impact), 57 relationships value 2 (medium impact), and 14 relationships value 3 (high impact). The matrix fill rate is 89%, indicating a relatively high and dispersed effect of the factors. The direct effects matrix is shown in Figure 8.

	1 : acces	2 : literacy	3 : image	4 : investment	5 : regulation	6 : individual	7 : income	8 : lifestyle	9 : digitalism	10 : technology
1 : Level of family and child access to cyberspace	0	2	2	2	2	2	3	3	2	2
2 : Level of Cyber literacy	2	0	2	1	2	1	2	2	3	2
3 : Families' mental image of their children's development	3	3	0	2	2	1	1	2	2	2
4 : The amount of investment in cyberspace technologies	3	2	2	0	1	2	2	2	3	2
5 : governments efforts to regulate cyberspace	3	2	2	2	0	2	1	2	1	3
6 : The state of individualism and globalization	1	3	2	2	2	0	1	2	2	2
7 : Household income per capita	2	2	3	2	1	2	0	2	2	2
8 : Changes in the tastes and lifestyle of new generations	2	1	3	1	2	2	1	0	2	1
9 : Digitization and virtualization of tasks	2	2	1	3	2	1	1	2	0	2
10 : Attractiveness and access to new technologies	2	1	2	2	2	2	1	2	3	0

Figure 8. Direct communication between the main drivers

Influence/ dependence map, is one of the main outputs of the structural analysis process in the Micmac software. Based on this, it is possible to distinguish the type and position of each of the main variables (in terms of being influential, dependent, bilateral or independent). Figure 9 shows the Influence/dependence map of the factors.

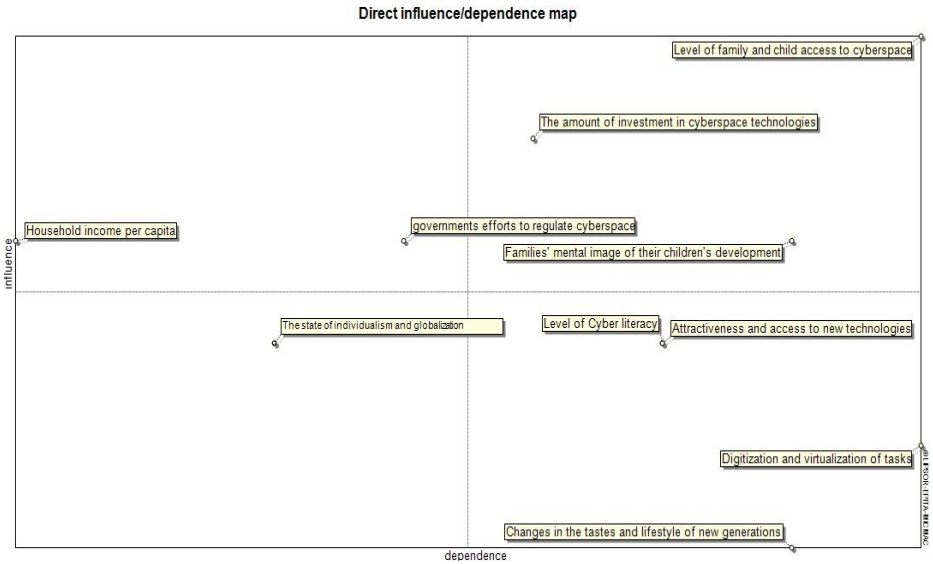

Figure 9. Influence/ dependence map of the ten key factors

Based on the analysis of the impact map and the influence of the ten factors of the system, it is found that two factors have high influence and low dependence (variables affecting the north/west part of the map), three factors have both high influence and high dependence (two variables in the sector in north/east of matrix), four factors have relatively low influence and high dependence (dependent variables in the south/east portion of the matrix), and finally, one factor has low influence and low dependent than the other identified key factors.

a) Influential variables*:* Two variables including "families' income per capita" and "government efforts to regulate cyberspace" have been identified as influential affecting the system. As the most critical indicators, the status of the system and its changes depends on them, and is not very flexible, as their dependence on research (the future of the child in cyberspace) for various reasons is not high and acts as relatively stable indicators. Changes in these indicators can lead to significant changes in research issue.

b) Bidirectional (mediating) variables: The three variables including "level of families and children access to cyberspace", "families mental Images of their children's development" and "amount of investment in cyberspace technologies in Iran and the world" are identified as two-dimensional variables in the future of children in cyberspace. These variables also called risk variables in some literatures that means they have a very high influence at the same time as the significant dependency; the nature of these variables is mixed with instability, as any action on them will have a response and change on other indicators. The relationships between these variables are highly complex.

c) Dependent variables: Four variables in this analysis are identified as dependent variables including "attractiveness and access to new technologies", "level of cyber literacy", "digitization and virtualization of tasks", and "changes in taste and lifestyle of new generations". These indices are very sensitive to the evolution of other influential and bi-directional variables. In other words, these indicators are vital for planners and policymakers because they are more effective and can be coordinated and influenced by policy makers. They can plan for the future of children's presence in cyberspace by influencing these variables. Therefore, these indicators can be called the output indicators of the system.

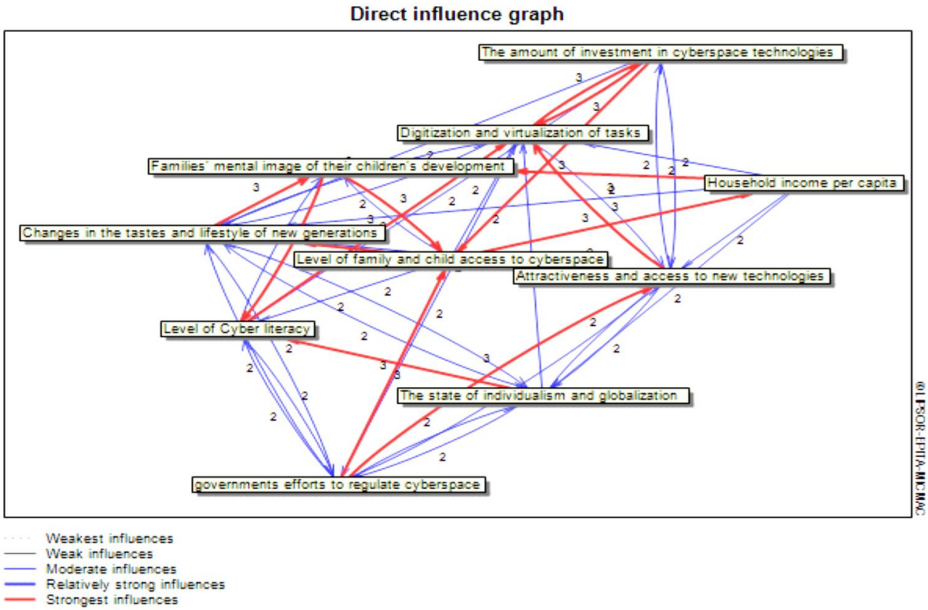

Figure 10. Direct influence graph between variables

d) Independent variable (Exceptional): In this study, "the state of individualization and globalization in Iran and the world" were considered less effective and less dependent than other variables and were presented as independent or exceptional variables in the analysis. However, given the relative proximity of this variable to the map center, it cannot be ignored. We, therefore, refer to it as the regulating variable and still have noticeable importance in the subject of research.

Finally, a graphical diagram of the intensity of the relationship between variables is presented in Figure 10. Understanding stronger relationships among factors is a useful guide to understanding the essential relationships in shaping the future of the child engagement in cyberspace. It can provide a comprehensive picture to decision makers. In addition, the researchers and the experts will use them to describe the story of the scenarios.

Describing future scenarios of the child in cyberspace

The overview of the four main research scenarios is presented in the following table, and the description of each scenario is shown in Table 6. The distinction between the scenarios stems from differences in the main constructor uncertainties. The first and second scenarios are somewhat similar and differ only in the third uncertainty. In the first scenario, the governance approach to regulating cyberspace is based on development while supervising and in the second scenario, it is based on non-intervention and ineffectiveness.

On the other hand, the third and fourth scenarios are relatively close and the difference between them is in the second and third uncertainties. In the third scenario, families recognize the Internet as a cause of deviation and the government seeks to limit and control it, while in the fourth scenario, families have a traditional approach but do not seek to eliminate the Internet and the government only seeks to monitor and not completely restrict the Internet.

This is while the first and second scenarios are the exact opposite of the third and fourth scenarios and differ fundamentally in all constructive uncertainties.

Table 6. Final quadratic scenarios based on key uncertainties of the drivers

Scenarios / Uncertainties	The first main scenario	The second main scenario	Third main scenario	The fourth main scenario
	Salmon in the pool	Salmon in the river	Guppy in the tank	Goldfish in the pond
Family income per capita	Improved or sustained		Worse	Worse or sustained
Families' mental images of their children's development	Internet is the literacy		The Internet is a distraction	Believe in traditional literacy
government attempts to regulate cyberspace	Supervision	No effect	Domination and control	Supervision
investment in cyberspace technologies	Increase		Decrease	
Family and child access to cyberspace	Increase		Decrease	
Total Impact Score	28-31	30-33	26	11
Consistency Value	0	0	2	0

Scenario One: salmon in the Pool

In the first scenario, "salmon in the Pool", the families income is improved or at least has not worsened. Families, know the Internet as an essential knowledge for children. At the same time, the government and relevant organizations are working to monitor and regulate children's activities in cyberspace. However, investment in virtual technology is increasing in line with existing global trends, and children's access to cyberspace is growing at an increasing rate. In this scenario, on the one hand, increased investment, digitalization, and increased access to cyberspace have improved internet literacy and the use of new technologies in families.

On the other hand, community and government commitment for supervision in this field (particularly in the area of child-related activities) have led to the awareness of the potential dangers and relative enhancement of child safety in cyberspace (however at the cost of some restrictions). Efforts to regulate children's activities in cyberspace and raise families' awareness have resulted in a level of empowerment and protection for children in cyberspace in line with changes in their lifestyles and virtualization of affairs.

Iran is connected to a global network that is not under the control of any absolute power, including corporations and governments. Users can also participate in the creation, sharing, and using of the content needed by children in cyberspace, although this partnership has specific rules and restrictions under the terms of technical and legal protocols. Indeed, as a regulator, government, relying on multicultural reserves and in line with the evolving global changes and innovations, pursues the process of development within the context of indigenous needs. In this way, it benefits from the cooperation of private and civil institutions and other stakeholders in the field of cyberspace.

Cyber literacy is inclusive across different classes of urban and rural society. The level of access to online space for children under 18 has reached 90%. Most children spend their leisure time in cyberspace and access to the internet is an essential indicator of children's well-being and satisfaction. The government also disregards the role of the operator and is limited to the role of policymaker or regulator.

At the same time, the tendency of governments to oversee cyberspace on the one hand, and the use of secure platforms by commercial companies on the other, greatly controls children's activities. This has led to a threat to the privacy of individuals, despite increasing security and reducing potential risks and cybercrime.

Scenario 2: salmon in the river

In the second scenario, "salmon in the river", as in the first scenario, the income status of families has improved or remained stable, and in the mental image of families, the Internet is considered to be a synonym for knowledge. Also, investment in virtual technologies is increasing in line with existing global trends. In the same way, the level of children's access to cyberspace is growing with the support of community and families. However, the government and relevant institutions do little to monitor, direct and regulate children's activities in cyberspace and the main policy is non-interference.

In this scenario, the access of families and children to new technologies and facilities in cyberspace have been greatly enhanced. However, the lack of regulatory and protection mechanisms may pose risks to children. Furthermore, the dramatic shift in audience interest along with digitalization without efforts to restrict cyberspace has led to increased cybercrime. Although over time, readiness and social awareness of these threats are also increasing. Iran is a part of the worldwide Web, and the concept of the national internet has no place in society and government. At the same time, the global network is dominated mainly by international corporations.

Along with the potential growth of government and the restrictive power of corporates, a range of new technologies make it possible for users to cope and break these restrictions. These include aggregation technologies, including wikis that can challenge the concentration of power, as well as block chain technology, as well as any new technology based on a peer-to-peer architecture.

The government has also adapted to the global changes and related technologies in the field of cyberspace and has partnership with international companies. Restrictions on user activity (except in the context of internationally agreed rules and regulations) have been minimized, and competing domestic and foreign companies are key players in the cyberspace.

On the one hand, child-related crime rates are rising in cyberspace, and the government is involved in improving protection and crime-prevention protocols. On the other hand, children are increasingly equipped to take advantage of opportunities in the expanding arena of cyberspace and the benefits of global communication. Children's access to cyberspace is close to 100%, and cyberspace plays a significant role in educating, leisure, and defining children's lifestyles. Due to the lack of government impression, the effect of international corporations has been maximized.

Scenario 3: Guppy in the Tank

In the third scenario, "guppy in the tank", opposed to the first and second scenarios, the family's income per capita is worse. The Internet in the mental image of families has generally been identified as a deviation factor. Therefore, there is generally no positive approach to children's engagement in cyberspace within families. Likewise, the government, for various reasons, does not encourage the increasing presence of children in cyberspace. The government is concerned about the potential dangers and believes in tight control and restrictions. It is natural that in this space, investment in cyberspace technologies is diminishing, and the rate of growth in children's access to cyberspace is very slow and only belongs to the leading social classes and not the public.

In this scenario, changes in the lifestyle of citizens is very slow; widespread digitization is not as high as possible on the agenda, the introduction of new technologies faces different resistance, and the people (without benefiting from economic welfare) has not open attitude and sufficient awareness of cyberspace. The relative convergence of families, dominant social institutions and the government about cyber threats, decrease children's access to cyberspace.

The full intervention of the Government has narrowed the field for citizens, the private sector and civil society. They are not able to participate in any policy formulation and content production. It has prevented them from maturing and flourishing. The national intranet for Iranians has replaced the global Internet network. The Iranians have access to their network and operate on local services provided by the government and its affiliated entities. The boundaries of Iranian cyberspace have been defined to some extent following the territorial borders of Iran and national security threats to the cyberspace have been minimized. Content production and distribution is carried out under the strict supervision of the government and only by individuals and companies whose competence has been approved by the government.

Although Children are less exposed to threats, they are not familiar with emerging technological capabilities. Due to being kept in isolated cyberspace, they are not prepared and informed enough to take advantage of opportunities and to interact and learn in cyberspace. A significant proportion of children still have access to the National Intranet network, but the limited content of the network does not meet most of their needs in most cases. At the same time, technological advances have made it possible for many pioneer children to communicate with the worldwide web.

Scenario 4: Goldfish in the pond

In the fourth scenario, "goldfish in the pond", the income status of families have deteriorated or mainly remained stable. Although the mental image of families about the Internet is not contradictory, it still has a traditional approach. As a result, investment in cyber technologies has not increased and the rate of growth of children's access to cyberspace has been slow and declining. In this space, the government are committed to monitor and regulate children's activities in cyberspace.

In this scenario, the lack of social demand for technological innovation and modernizing on the one hand, and the ideological viewpoint of decision-makers, on the other hand, has led to the imposition of higher limits than its global norm for the engegement of individuals and children in cyberspace. At the same time, the lack of economic welfare and lack of managerial will to speed up the process of digitizing tasks is slowing the process of improving cyber literacy. Children's access to cyberspace does not play a key role in the mental image of families.

Accordingly, children in the monitored environment encounter fewer risks in cyberspace. however, they are less empowered and prepared to face these dangers due to the lack of necessary skills. The government controls the infrastructure and network and allows users to operate within a certain framework that they consider to be in line with intended values and norms. The connection of the national network to the world network is not possible freely but within the frameworks determined by the government. Local government allows monitored connection with the global network and allows defined activities for citizens and private companies.

Children are improving their capabilities in cyberspace with Controlled acceleration and with the assistance of supportive institutions. However, lack of free access to the global internet and lack of sufficient investment make children asynchronous with emerging technologies. Some families have made it easier for children to access the worldwide web through anti filtering. But a larger section of society still has traditional approaches and does not attach much importance to cyberspace in the process of children's development. They do not oppose inclusive government intervention - at least in the area of children.

Conclusion

The future of children in cyberspace is one of the most important concerns and issues raised in cyberspace. Producing attractive content for children, monitoring children's online behavior, adopting appropriate networking strategies and Active coordination with the rapid growth of effective technologies, are among these issues.

In this study, we tried to identify, investigate and develop possible scenarios for future children's engagement in cyberspace by conducting a mix method approach including qualitative tools (interview and expert panel) and qualitative/ quantitative tools (questionnaire, scenario Wizard software, and Micmac software). The scenario based planning method was chosen because it can help us build images and stories of the future by identifying some of the critical elements that are likely to influence future construction (Bostrom, 2009). Through these images and descriptions, a more comprehensive understanding of possible futures is developed. As a result, the scenario planning method, itself does not contain any prescriptions and will only broaden the horizons of decision-makers towards future alternatives.

Consequently, the four main scenarios for the future of children's engagement in cyberspace are described, and structural analysis (relationships between influantial/ dependent indicators) is provided. Researchers, policymakers, and social activists can provide the necessary background for designing appropriate and desirable strategies by reviewing the findings and developing qualitative discussions about how and why.

According to the research findings, the five variables "level of child and family access to cyberspace", "families mental Image of their children's development", "investment in cyberspace technologies", "government efforts to regulate cyberspace" and "families income per capita", overall, have the most impact and most uncertainty in determining the future of the system. Each of the future scenarios can be realized by changing these driving forces. At the same time, the four variables including "attractiveness and access to new technologies", "level of cyber literacy", "digitization and virtualization of tasks", and "changes in taste and lifestyle of new generations" are There are variables that can be affected. Therefore, these variables also play a crucial role in shaping future developments and scenarios, and the emergence of any alternative to the future depends on the way actors interact with the these factors.

As a strategic conclusion, the realization of an optimal scenario for the child's future in cyberspace requires the attention of policymakers and planners to constructive factors whose modification can help to change the system deliberately. In this regard, from the perspective of experts, indicators such as "Government cybersecurity policy", "network access status", "interaction with the world web" and "the ability of users to participate in policy formulation and content production" are key strategic indicators. The way that these indicators are formed, will be very effective in navigating the path of future developments and gaining the readiness to face these developments.

However, social and technological drivers are changing, and the only way to successfully address these changes is a proactive approach (to adapt, change, or equip). It should be remembered that future studies - at least in the explanatory approach - attempt to alternate, prepare and extend leading-edge images in the field of research. In particular, the topic of "engagement of children in cyberspace" is directly related to "perceptions of community and family privacy" and any future prosperity depends on adapting and aligning the actions of decision-makers with the real needs and interests of diverse audiences (i.e., families); audiences who are quickly and comfortably equipped with the technological capabilities of the world, new media tools, and more technology-based choices.

Therefore, the strategic recommendation of this research is to strive to raise awareness among families about the strengths, weaknesses, opportunities, and threats of cyberspace for children, while also aligning the interests of managers and decision-makers in responsible institutions with demands and needs of a broad and diverse range of cyberspace audiences (with different interests, backgrounds, and ideas).

Also, the second strategic recommendation focuses specifically on the role of technologies in this area and on the importance of synchronizing with emerging technologies to maintain competitive power in a highly complex environment and to build trust and create value for audiences (families, youth, Adolescents and children).

Finally, any future study attempt at scenario development is ultimately a reductionist effort compared to the complexities and contradictions of the real world; however, merely identifying the influential components, critical uncertainties and possible images, can provide the appropriate context for decision makers to encounter the multi-layered reality,emerging changes and complex interactions. As a result, it becomes a platform for selecting and adopting strategies and priorities.

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