OYUNCAĞIN AKILLANMASI: DİJİTAL TEKNOLOJİ BARINDIRAN OYUNCAKLARIN TASARIMINA YÖNELİK BİR ÇERÇEVE ÖNERİSİ

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Özet: Oyuncak tasarımı, oyun kavramındaki ve çocuğun günlük yaşamındaki herhangi bir değişikliğe paralel olarak gelişir. Günümüz oyuncakları, oyuncağın zaman ve mekânla yakın ilişkisine bağlı olarak, farklı biçimlerde güncel teknolojik unsurları içermektedir. Bu çalışma, teknoloji barındıran oyuncakların tasarlanmasına yönelik bir çerçeve ortaya koymak amacıyla gerçekleştirilmiştir. Bu kapsamda günümüz oyuncak pazarında önemli bir yere sahip olduğu belirlenen oyuncaklar netnografik yöntemlerle incelenmiştir. Bulgulara bağlı olarak, teknoloji içeren oyuncaklar için oyun değeri ve kullanıcı etkileşiminin önemi dikkat çekmektedir. Her nesnenin tasarımında olduğu gibi, oyuncak tasarım sürecinin de kullanıcısı, üreticisi, zamanı ve yeri ile oldukça bağlantılı olduğu ortaya çıkmıştır. Günümüz oyuncak tasarımcısı; yeni çağ oyuncağını, oyuncağın oyun özüne saygı duyarak ve çağdaş dünyada hem yetişkinlerin hem de çocukların beklentilerini karşılayarak konumlandıracak olan kişidir.

Anahtar Kelimeler: Dijital Oyuncaklar, Oyun, Akıllı Oyuncaklar, Oyuncak Tasarımı, Teknolojik Oyuncaklar

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SMARTING THE TOY: A PROPOSAL FOR A FRAMEWORK FOR DESIGNING DIGITAL TECHNOLOGY CONTAINING TOYS

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Absract: Toy design evolves parallel to any change in play concept and daily life of a child. Today's toys, depending on the toy's close relation with its time and space, include current technological elements in different forms. This study is carried out to put forward a framework for designing technology included toys. Within this respect, the determined toys, which have an important place in today's toy market, are examined through netnographic methods. Depending on the findings, the importance of play value and user interaction for the technology included toys are underlined. As in every object's design, the toy design process is also found to be highly linked with its user, manufacturer, and time and place. Today's toy designer is the one who will position the new era toy by respecting the play essence of the toy and satisfying both the expectation of adults and children in the contemporary world.

Keywords: Digital Toys, Play, Smart Toys, Toy Design, Tech-Toys

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1. INTRODUCTION

Human beings have continued playing regardless of time and place, but in line with their existing conditions. Depending on the time and place; the form, methods, and borders of the play change. The tangible and intangible characteristics of the toys, which serve as mediums of play, are directly related to the period that they belong to. Thus, the qualities of the play show differences. Mertala et al. (2016) define playing with toys as a kind of 'object manipulation' and manipulation forms differ from each other depending on the context, manipulator, and manipulated ones. In the times of digital technologies that we are in, it is inevitable for children and toys to carry these digital characteristics of the new era. Toy's evolution to the new era requires a change in the toy design approach. Within this respect, this study examines the existing technology containing toys by considering their play characteristics, material qualities, and users and proposes a framework for designing technology included toys. This study aims to comprehend how this change has affected the toy concept, toy design process, and output of it within a human-centered perspective. Being able to evaluate today's technology included toys is only possible with understanding all the stakeholders of the process and related concepts. In that sense, this study is constructed upon play and toy concepts, toy market, transition from the internet of things (IoT) to the internet of toys (IoToys), existing toy design frameworks; and user experiences.

2. EVOLUTION OF TOY AND TOY DESIGN

Designing a toy is an act of implementing playfulness to the contemporary child's daily life. Thus, it evolves in time concerning the changes in daily practices. To follow the evolution of toy and toy design; play and toy concepts, toy market, how the internet of things lead to the internet of toys, and toy design frameworks are needed to be examined.

2.1. Play And Toy

Play stands as a flexible space in a more concrete structure and derives its existence both owing to and notwithstanding that rigid body (Zimmerman, 2004, p. 159). Huizinga (2018, p. 45) defines play as a voluntary activity that is related to the time and place, continues within a set of rules on consent, has its objective, arouses childifferent kind of emotions, and holds awareness of being different from the ordinary life. Caillois (2001, p. 9), in a similar manner, delineates the play as an activity that is voluntarily participated, has its pre-defined time and place borders, owns ambiguity, is free from functionality orientation, ends in the same condition as the beginning, has its own rules, sets up a second realty to the existing one and occurs with a free awareness of aeriality. Larsen (2015) also emphasizes play's characteristic of reconstruction of the reality with the participant's way of thinking, and within a Piagetian perspective, he draws attention to creating new worlds from the current one, thus he underlines the play's power of assimilation on the existing conditions. Play is the activity of creating new realities in the existing reality. Huizinga (2018, p.7), proposes the use of Homo Ludens (playing human) instead of Homo Sapiens (knowing human) to define humankind and sets playing as essential characteristics as reasoning for humans.

A toy is an object that carries playfulness in itself. According to Johry & Poovaiah (2019), for children playfulness lays down in their interaction with the environment, it involves the urge for participation, exploration, and link through the interaction. Their approach to playfulness matches up with the findings of a previous study by King (1979, p.86), which demonstrates how kindergarten children approach play. In King's (1979) study, willingness

and self-control stand as the two essential concepts for children to describe an activity as a play. Playfulness requires voluntary and self-driven participation of a person regardless of all the external factors. Children use toys to set up and sustain a playful activity. The child includes a variety of objects ranging from small-sized to large-sized, from simple ones to complex ones in the activity of play, and their attributed meaning and function in the play can change contextually (Morgenthaler, 2012, p.65). Within this perspective, any physical object included in the activity of play can be a toy; on the other hand within a toy design perspective, toys can be defined as the physical products that are designed primarily for playing purposes (Kudrowitz ve Wallace, 2010, p. 37). In this study, the term 'toy' implies the physical product which is designed and manufactured for children's play.

2.2. Toy Market

The toy market consists of a vast variety of firms ranging from small-scaled to large-scaled or from local to global ones. This grand and multiplayer industry always seeks out innovative products, and innovative products become one of the main constituents of this industry and because of the rapid change in styles and trends toy industry is compared with the fashion industry (The Toy Association, 2014). Lifetime of new ideas and new products changes according to the context and concept. Del Vecchio (2003, p. 26) explains that today's dominant toy brands in the industry have come into existence in the beginnings of the 1900s and categorizes the successful toys in the toy market into two as the ones which have a long lifetime and are played by different generations like Barbie and the ones which have a shorter life span that become suddenly popular and then disappears from the market. For both categories, there is a change and transformation in successful, new, and innovative products.

When we look at the recent history of the toy, we coincide with the transformation in the last half-century from being a tangible, physical activity-related, small-scaled version of the adult world to output that belongs to abstract, less effort requiring, an imaginary world (Hjarvard, 2013, p. 103). This transformation is not only related to the toys, but also with children and all other elements in a child's daily life. Especially in 21st century, change in the culture of child play has become more obvious, with the help of the media parents' security concern has increased, and virtual world, digital plays, and toys superseded natural and constructed open-air playgrounds and toys (Frost, 2012, p.120). With the help of technology, childhood and physical interaction between children have begun to move to digital space, and as a result, the industry paid attention to this transformation and has made strides in developing non-display platforms such as internet-connected toys for children's online play and socialization (Holloway & Green, 2016). Robots, computers, toys that have the abilities of autonomous decision making, programmability, communicating, showing adaptive behavior, gaining knowledge have become parts of children's daily lives (Druga, Williams, Park, & Breazeal, 2018, p. 232). Technological development has played a major role in the transformation in the play experience of children and toys.

2.3. From The Internet Of Things To The Internet Of Toys

'Smart toys' and 'connected toys' can be mentioned as reflections of the technological development in the toy industry. A smart toy is a popular kind of technology-based toy which includes embedded electronic components, which has the capacity of adjusting to the user's abilities and which creates two-way interaction between child and toy. (Çağıltay et al., 2014, p. 703; Goldstein, 2011, p. 322). Tamagotchi and Furby can be counted as the first example of

smart toys. Internet of Things (IoT) has affected toys' connection to a network and the creation of connected toys. IoT is the substructure of a network that connects the objects and provides the opportunity of managing the objects' data mining and communication of data (Dorsemaine et al., 2015, p. 73). Nowadays, reflections of this infrastructure and technology can be perceived in the toy industry. Internet of Toys (IoToys) resemble other IoT devices, they are physical toys that are connected to the internet and potentially to other toys via Bluetooth and Wi-Fi (Mascherino & Holloway, 2019, p. 2). It is not obligatory for all smart toys to connect a network or for all connected toys being smart.

For this reason, Mascheroni et al. (2017) use the words software-based toys for connected or smart toys that have some kind of sensor, electronic, or software and they categorize the characteristics of these toys as having an internet connection, simulation of the human interaction and programmability. Toys can carry only one of these characteristics or a combination of two or three of them. Thus there can be created many alternatives that are both smart and connected. Within this respect, the existing smart toys can be thought of as an IoT which make use of network and sensor technologies for increasing functionality of existent toys, which has the function of artificial intelligence and which provides the experience of augmented reality (AR) (Tang & Hung, 2017, p. 1).

Trends in the toy industry have a strong connection with technological developments. The application of technologic elements on toys facilitates a different kind of plays which have a rich and multi-layered structure and has educational outputs with a high rate of playfulness (Heljakka & Ihamäki, 2019). Thus, stakeholders of the toy market like manufacturers, parents, educators embrace these toys. Embracing the STEM (Science Technology Engineering & Math) approach and toys to develop skills of children and increase in the usage of AR in toys have positively affected and will continue to affect the demand for smart toys (Technavio, 2018). Ng et al. (2015, p. 57) mention the popular trends in the toy industry as toys with digital components, toys that can be integrated into smartphones, integration of digital components to analogous toys, and integration of analogous components to digital toys. The concepts of play experience and toy find a place in the intersection of physical and digital, and the values of the concepts increase by the support in between physical and digital.

2.4. Toy Design And The Frameworks

Repositioning play and toys in between digital and physical via current technologies has impacted the toy design and design process. To understand this, existing classification tools and frameworks have been examined.

To help designers to categorize toy product concepts, Kudrowitz ve Wallace (2010, p. 36) have developed two tools named as play pyramid and sliding scales of play. Play pyramid is a map that helps designers to categorize toy concepts by positioning them within four different axes as sensorial, fantasy, construction, challenge. The sliding scales of play, which is a tool for idea generation, includes five scales named involvement, social involvement, level of restraints, mental/physical, gender. Gielen (2010, p. 4), based on his / her toy design course at Delft University, explains three concepts that affect the quality of design output, which are also found hard to understand by students, as aimlessness, empathy, play value. In aimlessness, the process is more important than the output, for the player and it is the source of motivation, thus design's problem-solving nature differentiates in toy design. In empathy, instead of applying sources about

children and childhood memories, direct contact with children is encouraged among the design process. Play value is a term to define the liking of a child which consists of different elements like complexity, challenge, contextuality, compatibility with a child's character. Heljakka's (2019, p. 8) framework proposal for universal toy design consists of physicality (aesthetic & materiality), functionality (the ability of manipulation), affectiveness (emotional engagement), and fictionality (containing story). In addition to the above-mentioned studies that reflect a general perspective on toy design, other studies examine technology & toy intersection.

In the process of reframing toys by technology, there can be mentioned about three major actors as academicians, designers, and manufacturers. Yamada-Rice (2017, p. 21), has proposed a model to make different actors work together via design thinking methods. Although this model is not a very detailed one, it is important because of handling the communication and interaction process of the parties within a design-focused approach.

Within the light of studies of Clanton (1998), Levy& Weingartner (2003), Pagulayan et al. (2002), Rogers et al. (2002), Schrafel et al. (2004) Ye &Ye (2004), and Universal Design for Play Guidelines (2004); Hinske et al. (2008, p.84), about the integration of technology to toys, suggests these guidelines: to consider added value, to determine the action, to be toy and interaction focused, to have discreet involvement of technology, to be able to work when technological properties are off, to interlace design and implementation, to provide safety, to provide feedback, to support for the dynamics of the play environment, to have iterative development process.

Kara & Çağıltay (2020, p. 7) structured their guide to design computer interacted smart toys for preschool children on three themes as content, visual design, and interaction. Consistency in between real-world and artificial content, the importance of feedbacks, durability, and get help from plushy toys for the children's probability of hurting themselves or other ones are the essential aspects of their guides.

In addition to academic studies about the integration of technology into toys, technology leaders have attempted on this issue. Depending on the technological improvements in the late 1990s increasing share of the video consoles in the toy market, under the partnership of Mattel and Intel a Smart Toy Lab (STL) was established to create innovative products (D'Hooge & Goldstein, 2001, p. 1). Team of Intel engineers & Mattel designers explains the vision behind technology toys that comes from the intersection of two companies with ten characteristics (D'Hooge & Goldstein, 2001, p. 2) as fun, open-ended, child is in control, challenging and creative, educational, grows with the child, involve the personal computer, perceived to be high technology, innovative, at least one magical feature.

Another reflection of the toy's transformation can be seen in the industry's expectations from the designer. Kudrowitz (2014, p. 253) mentions that in the contemporary toy production industry, expectation from the designer goes beyond traditional professional skillset and extends to be able to comprehend the ways of integration of sensor technologies, electronic technologies, and other new technologies. Another aspect that Kudrowitz (2014, p. 253) emphasizes is the vanishing borders in between engineering design and industrial design.

3. METHODOLOGY

This study handles the existing technology included toy designs via netnography, which is one of the qualitative research methods. Ethnography can be defined as the combination of different methods, which presume personal

participation as the key factor of comprehending a culture or social structure, such as participatory observation, interviews, discourse analysis, video, photo, and document analysis (Hobbs, 2006, p. 101). Wasson (2000, p. 377) expresses that the ethnography method that belongs to applied anthropology has extended through the field of design due to its potential for providing new perspectives to designers in understanding the interaction between consumers and products. Internet-based ethnography or netnography is a research method that adapts ethnographic research methods for examining cultures and societies that occur via computer-mediated communication (Kozinets, 2002, p. 62).

For 2019, the market size of the global toy industry has reached 90 billion dollars, the market size of the USA toy industry is estimated at around 27 billion dollars (http 1; http 2, http 3). In the USA having such a great market size, as representing all businesses in the toy industry Toy Association annually organizes The Toy of The Year Awards. Regarding the market size of the toy industry, this study examines a selection of toys from the awarded ones of The Toy of The Year Award 2020. The number of the finalist toys of the 2020 event is 114 from 16 sub-categories (http 4). With the effect of the size of the US toy market, the finalist toys of 2020 have been the starting point of the netnographic research. Firstly, all 114 finalists were evaluated by considering the inclusion of sensors or electronic technologies and thus the number of toys was decreased to 20. The finalist toys which has a sensor or electronic technologies are Erector Robotic, Leap Builder-Smart House, Tumbling Hedgehog, Smart Pixelator, Cry Babies, Pictionary Air, Linkimals-Llama, Leap Builder, Match a Saurus, Invisibility Cloak, TechMods-Hot Wheels, Tori-Banda Namco, Little Live Scruff, Lumies Color Change, Coding Critters, Myla Unicorn, Artie 3000, Lego Boost, Elenco Mech Robot, D-O Interactive Droid. These twenty toys fall under different categories such as plushy toys, dolls, construction toys, STEM toys, toy vehicles and include different levels of technologic solutions. The richness of the categories is valuable for drawing a more general framework of the integration of electronic and sensor technologies. For this study, customer reviews, questions, and related answers, which have been put down till July 2020, in the biggest online market place amazon.com are analyzed. With the help of the computer-aided qualitative analysis software (QDA Miner Lite), at first, codes were constituted following the previous studies and collected data, then they brought together under the themes and the current situation is explained inductively.

4. FINDINGS

Common aspects of the toys in this study are having both digital and physical components, using network technology, providing an opportunity for interaction with children via electronic and digital sensor technologies. All of the toys have a different level of these aspects and some of them don't have any network connection technology. The reason behind choosing the toys in this study from an award of a professional association is based on the supposition of being more successful products and the possibility of ease of reaching data relevant to technology usage in toy design. In addition to this, feedbacks have enabled us to get problems and suggestions about the structure of the traditional physical toy and its integration with technology. In this study, some descriptive data, which can have an impact on the design of the product, such as by whom, why, when, and for whom the product was purchased has been accessed. According to gathered data, usually, toys are purchased by parents or other family members for children. Frequently, toys are sold as a gift on special occasions such as birthdays, Christmas. Since the toys are bought for children, toys having educational potential

like building blocks, STEM toys, coding toys are more preferred.

This study shows us, the time between a child's first interaction with the toy and the beginning of the play activity constitutes a major role in product experience and it impacts directly most of the design decisions. It is expected from the toys to have the complexity level of assembly that a child can overcome. Insufficient guidance in user manuals, the necessity of having adult capabilities in this process can be counted as the causes of the problems in the assembly process. In this study, it has been found that there are also toys that carry technology to their manuals and prefer digital guides instead of traditional printed guides. However, one user describes the mobile app of the digital guide as nonintuitive, boring, and slow. There are mostly similar negative user reviews about digital guides and this points to us that the application of technologies for guidance is not embraced by users. In some reviews, especially for the disassembled STEM toys for beginner level electronic, coding and robotic subjects, parents emphasize the complexity level of the assembly process by mentioning that even though they are engineers or working in the electronic sector and using their skills on the assembly process, they have spent hours on assembly. In some assembly cases, parents have taken an active role in a major part or even in the whole of the process, thus the child has taken a shorter role from it should be. In addition to that, some assembly cases require more muscle skills from the one children have or which requires some additional electronic equipment that can be harmful to children's self-use like a hairdryer. In a conveniently designed assembly process, with the controlled participation of the parents, the process of making the toy ready can turn into a family play.

As mentioned in the previous sections, most of these toys require connecting a network via Wi-Fi and Bluetooth technology for actualizing the play experience and interaction. In addition to that, network connections make other devices such as computers, phones a part of the play experience. Negative factors that affect or even some cases block play experience are differences in software infrastructures of different devices, incompatibility between these devices and toys, network connection problems, problems of applications that are digital space of the toys. In addition to that, some parents state that they prefer to make their children set as little as possible interaction with smart devices like phones, tablets and they underline the addiction problem of these devices. Both assembly problems and connection problems can cause a delay in starting play experience, thus play which contains fun in its nature becomes a boring, disappointing activity before it begins. Another important aspect to consider in the design process is the size of the toy's digital spaces and applications in different devices. In addition to that, users have given positive feedbacks on toys that belong to the same range of products of the same company, can connect to a network or each other, and work simultaneously or react; in other words for toys that make the interaction between objects possible.

Besides network connection, other important characteristics of the examined toys are improvement in functionality and interaction capability of toys via sensors or other electronic components. With the help of sensors, collected data is processed and other electronic components provide feedback and establish an interaction between toy and child. Feedbacks are given via auditory, visual, and other methods. The frequency of the feedback is a significant factor that affects a child's experience of play. For one of the toys that give too much auditory feedback, most of the parents have complained about the annoying noise when the toy is on and mentioned that their children usually prefer to

play in off position like a traditional toy. And also, some other toys have been criticized for interaction problems depending on insufficient auditory and visual feedback. Misperception of the sensors stands as another problem that affects interaction negatively. Environmental factors like ambient light, noise level, and surfaces can cause the sensor to misperception of sensors. Surface problems also negatively affect the functional capability of electronic and mechanical components which make the toy move. Battery or electronic problems can make toys be used as any other toys that don't contain technologic elements or even in some cases, toy become unfunctional thus child doesn't prefer to play with it.

In addition to the above-mentioned findings specific to technology integration to toys, more general information about toys has been attained. In user reviews, there are a lot of feedbacks about the mechanical and physical properties of toys. One of them is the heaviness problem of toys which occurs because of not paying attention to the child's physical capacity. Material-related problems are also common in toys. Usage of cardboard or alike indurable materials for a toy that is a part of a set, material smell, difficulty in washing, and cleaning toy can be given as examples of material-related problems.

The modularity of toys positively affects customer choices. It is expected for toys to be as open-ended as possible and contains a sufficient number of parts to construct different play objects. Thus children can create their own story and play. On the other hand, another customer expectation on modular toys is being compatible with other modular toy series of the same company and able to be used in different combinations. Disassembled toys are also expected and to allow creating alternative play objects and to be customizable. There are some safety concerns like swallowing the toy on both modular toys and disassembled toys depending on the dimensions of separate parts.

5. DISCUSSION

Toys have a major role in a child's daily life, designing a toy is a multi-layered problem and toy design can be more complex when it is combined with technology. Every phase of interaction between child and toy is needed to be designed. While trying to decide a toy in between alternatives, customers have a variety of sources such as online product details, customer review categorization, and product review videos for evaluation. However, although there have been such rich sources, customers still have negative experiences with the toy after the purchase. Their negative experiences with the purchased toy, which was bought after careful examination of product details, reviews, and other sources, indicate the inaccurate and insufficient framing in the design process for categorization and challenge level of a toy.

A toy should be complex enough that a child can overcome before and during the play. Especially for disassembled or modular STEM toys, the pre-play phase involving assembly and preparation activities is essential for the educational process that toys propose. Toys that carry a lower complexity level from the child can handle can be unattractive because of a lack of challenge. Creating an entertaining learning experience requires providing an optimum level of complexity and challenge as stated in the play pyramid of Kudrowitz ve Wallace (2010) and play value of Gielen (2010). The kind and level of technology integration can be the main topics to be considered in the design process. Although sensor and network technologies have been used to improve the play experience and quality of the toy, on the contrary, it can worsen the experience. Content and interaction should be carefully calculated while proposing new versions and new experiences of existing more traditional toys. For the toys that have a long lifespan in the toy

market and over-identified with a specific toy category like Lego or Meccano, users can have concrete expectations depending on previous experiences. If previous experience is not very well integrated with technology, people can choose the traditional one over the new technologic version. If integration is successful, it can take a toy and play experience to a further level. For example, in one of the user reviews, Lego's new technologic set is defined as the application-based experience of construction. This indicates us, previous experiences have been transmitted successfully to the new set. As being designed and produced tangible objects for child play, toys need to propose a play experience by themselves. Some parents opt for less usage of monitors, mobile and electronic devices by a child. In addition to that, as before mentioned, connection problems related to software and hardware can occur in technology included toys. In any problem with the battery or electronic components, the play experience is needed to continue in a different dimension. If not, the toy turns into a useless, unidentified object. User's manipulation on/off mode of a toy, ease of battery change or fulfill can support play experience of a toy. In an ideal scenario, technology should support play experience, should not damage the process, should be turned off according to the user's wishes, and should carry play characteristics when it is turned off.

The scope of the physical toy has extended and it evolved to a brand new world that includes electronic components, a sensor, network connection via technological developments. Devices such as mobile devices, computers, TVs have become parts of the new toy and the new play experience and served for interaction between child and toy. However, on the contrary to the transformation of the toy, there is not any change in the essence of the play (Figure 1).

Other studies also support this approach and Huizinga's ideas about the play are still valid. As being used in a free, voluntary participated space which is sculpted by time and place, the essence of the toy and its interaction with the child are two main aspects to be considered in the design of play object in other word toy. With the help of these technological developments, two issues that

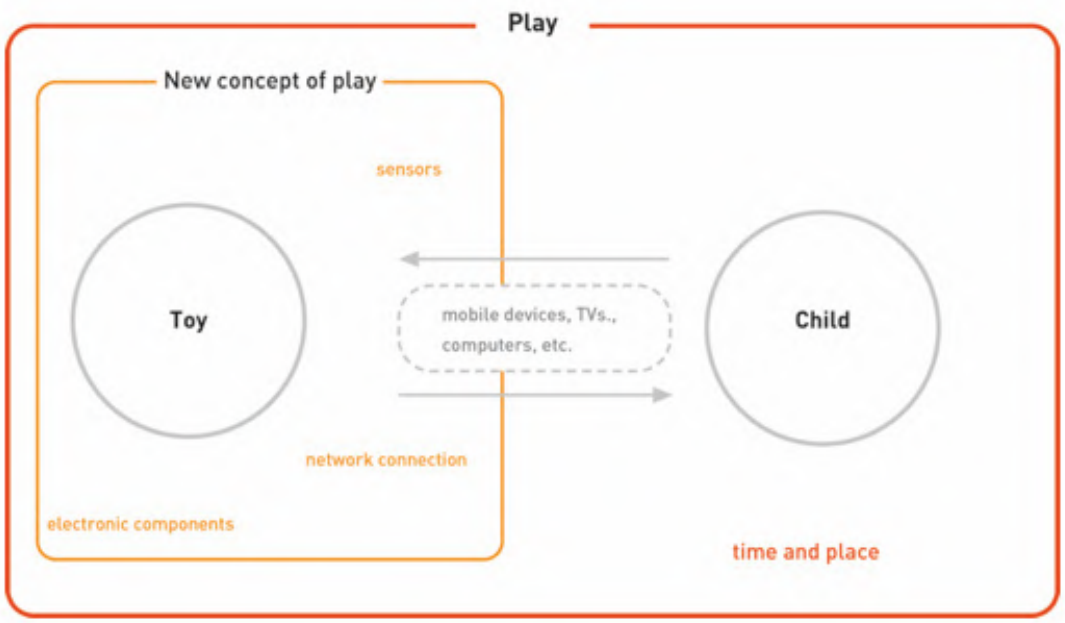

Figure 1. The Universe of Play.

should be taken into consideration when making design decisions in new product development processes are the situations where socialization is limited and data security. Ruckenstein (2013, p. 476) states that digital technologies support children in extending their daily world and changing their environment via toys and online network groups. In the times when there is a mandatory restriction in a face-to-face interaction of children, providing interaction and play experience via new technologies can play a major role in child development and continuity of play. Within this context, beyond being an improvement or preference, digitalization and technology can be a requirement for the market. However, connecting a network and constantly sending data to this network can be perceived as a potential problem for technology included toys. As being a growing market, for the toy industry, gaining the trust of parents and children, privacy and safety precautions are essential for success (FPF & FOSI, 2016, p. 16). Constructing this trust also takes its place in the field of toy design.

CONCLUSION

The design process takes its shape depending on a variety of elements such as user, manufacturer, designer, time, and place. All of these elements have dynamic structures. Due to this dynamic structure, it is essential in the design process to take action suitable for the existing situation and goals. This remains the same for toy design.

This study has discussed the elements to be considered in the design of the new era toys. Key themes that this study reveals the essential points of the technology included toy design are properties of the product, drive for purchase and play experience. Properties of the products determine the suitability of the product to target age, interactivity level, technology inclusion level, traditional play inclusion level, way of transition from digital to physical, option to be played manually. Drive for purchase is dependent on by whom, to whom, when, and why the toy is bought. The play experience is drawn by positive and negative experiences and related emotions in the first interaction time like assembly or comprehending the play guide, action of the play.

The most important thing in designing the mediums of play is the essence of play; it is playfulness. Integrating technologies into toys are the attributes of development and being contemporary, however, every stage of play playfulness should not be ignored. For a toy, the truth is its potential for evoking play. For toy design, both the expectation of adults and children should be fulfilled. Since one of the main points is the continuation of play, the toy's ability to work in different conditions and different technologic structures gains importance in integrating technologic components. While educational values of technology including toys are being prioritized by its buyers (parents), toys are also expected to provide safe play in the digital world them. In the play, humans, time, and place are connected. For that reason, the technology of toys of this new era can not be handled independently from the human factor.

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References of Figures

- *Figure 1. The Universe of Play. (Credit: Authors)*