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Analyzing Decision-Making Factors of Green Design for Kid's Toys Based on the Concept of Product Lifecycle

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Abstract: In promoting the SDGs (Sustainable Development Goals), increasing attention has been given to environmental pollution and abnormal climate issues. In particular, a large number of products made of plastic materials have caused harm to the environment. Secondly, with the improvement of average spending power, many parents are more willing to buy toys for their children. However, the lifespan of kid's toys is often short, and most materials are made of plastic, which also causes issues as they are not easy to break down and are difficult to recycle. This study investigates the concept of the product life cycle in kid's toys and explores the decision-making factors of green design. First, analysis and induction were conducted through literature collection. Through semi-structured interviews with experts, the design dimensions related to the green design of kid's toys and the elements that affect the willingness of consumption by consumption values and behavior were obtained. After the questionnaire survey and data analysis, the design factors and purchasing decision factors of green design for the product life cycle and consumption values and behavior of kid's toys were obtained. Finally, combined with kid's toy design, green design, product life cycle and consumers' consumption values and behavior, the decision-making factors for the green design of kid's toys were extracted, which included (1) using non-toxic materials; (2) designing for maintainability and disassembly of the toy; (3) refining the toys to be artistic and collectable; (4) upgrading the educational functions of toys; (5) improving the recycling of toys; (6) emphasizing green packing; (7) creating a green brand and increasing product visibility; and (8) advocating the value of green design for toys. In addition to supplying green design considerations for kid's toys to designers and companies, the results can also be used as an important reference with regard to the research topics of product life cycle, toy design and development for the sustainable designs of products.

Keywords: green design; product life cycle; kid's toy; consumption value; consumption willingness

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1. Introduction

Recently, with the world's rising awareness of environmental protection, people are paying greater attention to plastic pollution and are participating in plastic-free campaigns. Plastic products in the industry of kid's toys, however, are often ignored by the public. Moreover, games are important for children's development and accompany our kids during this process through their interactions with toys. In particular, with sub-replacement fertility, increasing average spending power plus children's love of toys and parents' generosity with them, low-priced plastic products, possessing a short service cycle, inflict severe damage to the environment [1].

From the perspective of consumption, the speed of environmental damage caused by product consumption and related services is far greater than the speed of restoration, recycling and processing of natural ecosystems [2]. Therefore, the environmental damage caused by human consumption is an irreversible fact, and it is even more impossible to expect that consumption behavior can reach a balance with the environment in a short period of time.

However, according to relevant surveys, most consumers are prepared to support the concept of sustainable development and environmental protection by purchasing eco-friendly products [3]. Unfortunately, such a statement is in contradiction with the actual behavior [4]. This leads to concrete practices that only few consumers actually do. In today's consumer-dominated era, there may be more opportunities to advance sustainable development goals; however, consumer behavior decisions often depend on their attitude towards the environment [5].

According to the data in the "2018–2023 China Toy Manufacturing Industry Production and Sales Demand and In-vestment Forecast Analysis Report" by China's Prospective Industry Research Institute, 70% of parents are willing to spend 25 to 50 US dollars on kid's toys. In 2021, the total value of sales in the toy industry globally outstripped USD 100 billion, and it was projected that, in 2023, the Chinese market, the largest country exporting toys, will yield USD 300 billion in value [6].

In addition, in 2021, consumers in the United States invested more than USD 38 billion in toys, including action figures, dolls, jigsaws, plush toys and vehicles [7]. Accordingly, under enormous production, topics of the environment and rubbish have emerged. Although toys are lightweight, soft and moisture-proof and 90% predominantly made of plastics [8], they can seldom be recycled. In addition, because it is not easy for toys with material components that include electronic parts to be taken apart, collectors frequently decline to collect them [9].

As children are inconstant in their affection, most toys have an average lifespan of only 6 months [10], and thus the life cycle of toys is not long. Over recent years, while many parents are ready to purchase toys that are more appropriate and harmless to the health of their kids, the industry of kid's toys mostly concentrates on designing delicate appearance and multi-functional interactive toys as well as on the non-toxicity, harmlessness and solidness of toys.

From the perspective of the use of resources or environmental protection, the conventional processing methods of existing products are inconsistent with green development [11,12]. Thus, if the preceding mode of product development continues, it will impose an intolerable burden on the environment. Over the past few years, governments around the world have advocated that the masses should have an understanding of how important environmental protection is and stressed green design, production and consumption for enterprises and designers so as to reduce damage to the environment.

Green design in itself being a mode as a whole, considers ecology, energy conservation, environmental protection and sustainable development and highlights the harmonious coexistence between mankind and the ecological environment [13]. As a result, during designing, the core principles of "recycling, low pollution and energy saving" should be followed as much as possible. Instead of designing products separately as such, green design values the thought of a cyclic product life cycle. Consequently, negative influences of the entire life cycle of products on the environment can be eliminated [14].

In the past, there was little discussion on issues related to the sustainable development of kid's toys, in particular the literature on kid's toys was low. This also means that, in the literature of kid's toys, we still have many problems that are worth investing in. However, we know from the literature that a large number of kid's toys, once discarded, cause considerable environmental problems, and this urgently needs to be solved.

Therefore, it is necessary to examine the decision-making factors of kid's toys in green design through the thinking of product life cycle and further pull the kid's toy industries into the ranks of sustainable development and increase more opportunities for discussion. Based on this, relevant discussion and analysis are conducted for the environmental problems behind the design and development of kid's toys. It is hoped that this research can provide an important reference for the related research fields of sustainable design and make contributions to the topic of kid's toys under the goals of sustainable development.

Research Purposes

This study leads to a theoretical discussion of related literature through green design and product life cycle. Including the analysis and comparison of the green design point of view of the development and design, production and manufacturing, packaging design, consumption and use, recycling and other stages of the product life cycle and then obtain the design elements of kid's toys. Secondly, using the analysis of the consumer's consumption values and behavior, we know the decision-making factors that affect consumers' purchase of kid's toys and finally summarize the decision-making factors of green design of kid's toys. Thus, the purposes of this study are:

1. Summarizing the elements of green design for kid's toys and product life cycles and the factors of consumption values and behaviors influencing consumption willingness.
2. Analyzing the designing elements and purchase decision factors of green design for product life cycles and consumption values and behaviors.
3. Extracting the decision-making factors of green design for kid's toys by combining the de- sign for those toys, product life cycles and consumption values and behaviors.

In particular, due to low fertility rates and an emphasis on children's growth, parental investment in toys is increasing year over year. Manufacturers are beginning to highlight business opportunities for kid's toys to attract their attention through exquisite designs and stimulating their senses through colors, materials and shapes. [15]. For that reason, manufacturers ignore the environmental issues arising from kid's toys once they are discarded.

Only considering the novelty and market share of kid's toys and ignoring the consideration after the end of the product life cycle cannot effectively promote the awareness of green supply chain. Secondly, the life cycle of toys used by children is short, and the amount of garbage caused will only increase. This causes damage to the environment and ecology, and this problem of abandoned kid's toys has been neglected for a long time.

This study, investigates the concept of product life cycle in kid's toys and explores the decision-making factors of green design. There is increased promotion of businesses to invest in green manufacturing and the green supply chain. In addition to supplying green design considerations for kid's toys to designers and companies, the results can also be used as an important reference with regard to the research topics about product life cycle and toy design and development for sustainable designs of products. Accordingly, this study proposes a decision-making factors model for the green design of kid's toys (Figure 1). The content of the following article will introduce how this model is established and constructed through relevant investigation and analysis conclusions.

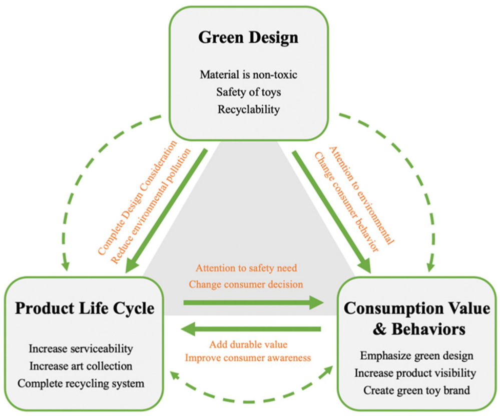

Figure 1. Model for the decision-making factors of green design for kid's toys (Source: compiled by this research).

2. Literature Review

2.1. Green Design and Product Life Cycle

Internationally, there are numerous glossaries similar to "green design", including ecological design [16] and environmental design [17]. Thus, green design itself means designing for the environment, thereby, settling the conflict between an industrialized society and the ecological environment and balancing the relationships between the development of economies and cultures.

The ISO 14006, which is derived from eco-design, was formulated by the ISO Environmental Management Technical Committee with reference to the Spanish UNE 150301 standard. In addition to assisting enterprises that introduce environmental management systems, enterprises are also encouraged to incorporate environmental protection elements into product design and development and then serve as a guide for environmental management systems to introduce ecological design.

ISO 14006, on the other hand, considers eco-design as a "systems approach" that takes environmental factors into account during product design and development, thereby, reducing possible adverse effects on the environment during the product life cycle [18]. Therefore, the introduction of life cycle thinking into company operations is the goal of ISO 14006, and the analysis and assessment of the environmental impact obtained during the product life cycle are integrated into the design and development process [19,20].

Secondly, for green design, its design consideration based on environmental protection and the transformation that indirectly affects the social and economic system are also an important part of promoting sustainable development. After the United Nations proposed 17 sustainable development goals, sustainable development has also produced wider interpretations and diverse possibilities [21]. In contrast, the promotion of sustainable development has also allowed various industries to develop new economic innovations and actively invest in them.

This will change the operating model of the past market and transform it into a development prospect with sustainable innovation value [22,23]. As enterprises are willing to invest in transformation efforts for sustainable development, the accumulated green image and sustainable management strategies also give consumers a higher sense of trust in enterprises [24]. Thus, changing products, people's behavior, business services, cities and even entire socio-economic systems through the role of sustainability [25] can advance our understanding of how to achieve sustainable transformation [26].

Green design contains the 4R design principle proposed by Burall [27]—namely, Reduce, Reuse, Recycle and Regenerate. Bor and Blom [28] further proposed the 6R principle—that is, Reuse, Remanufacture, Recycle, Redesign, Reduce and Reconcept.

Among them, the ones most relevant to design developers are Reduce, Reuse and Recycle, which are also in line with product life-cycle considerations. The simplified design of products is mainly through the green design, which reduces the waste of space, materials, processes and use of products and does not reduce the function and aesthetics of products, thereby, improving the effectiveness and sustainability of products [13].

Therefore, green design mainly focuses on "recycling, low pollution and energy saving" [29]. Whether products are convenient for detaching and dissembling is a major consideration of green design in the designing stages, and it is imperative to avoid toys that are too solid to be detached as well as to guarantee modularization and cut the use of materials [30,31]. These design principles all point to simplification throughout the designing process, capable of reducing the consumption of energy and resources. In the meantime, for the appearances and features of products, it is essential to prevent unnecessary decoration and waste and prolong the performance of materials and service cycle of toys.

Furthermore, consumers should leverage recyclable, renewable and reusable materials or parts to the best of their abilities. In recent years, under the trend of sustainable development, the concept of green design has also been widely discussed and applied in various fields (Table 1), which shows the increasing importance of green design, and this must be continuously promoted under the goal of sustainable development.

Table 1. Discussion and application cases of green design concepts in different industries.

Paper Title	Author	Area	Year
Green Design and the Market for Commercial Office Space [32]	Wiley, J. A.; Benefield, J. D.; Johnson, K. H.	Architecture	2010
Where do children choose to play on the school ground? The influence of green design [33]	Lucas, A. J.; Dyment, J. E.	Education	2010
Rethinking the future low-carbon city: Carbon neutrality, green design and sustainability tensions in the making of Masdar City [34]	Griffiths, S.; Sovacool, B. K.	Ecology	2020
A review on green supply chain aspects and practices [35]	Islam, S.; Karia, N.; Fauzi, F. B. A.; Soliman, M.	Supply chain	2017
A diagnostic model for green productivity assessment of manufacturing processes [36]	Pineda-Henson, R.; Culaba, A. B.	Manufacture	2004
Materials selection of thermoplastic matrices for 'green' natural fibre composites for automotive anti-roll bar with particular emphasis on the environment [37]	Mastura, M. T.; Sapuan, S. M.; Mansor, M. R.; Nuraini, A. A.	Material	2018
Exploring the relationship of green packaging design with consumers' green trust and green brand attachment [38]	Yang, Y. C.; Zhao, X.	Consumption	2019
Green product design considering functional-product reference [39]	Hong, Z.; Wang, H.; Gong, Y.	Design	2019

Source: compiled by this research.

A product life cycle can be divided into four phases: introduction, growth, maturity and decline [40–42]. In addition, Terzi et al. [43] divided the product life cycle into three stages from the perspective of product life-cycle management, including (1) the start of a life cycle: designing and manufacturing; (2) the middle stage of a life cycle: use of products, services and maintenance; and (3) the end of a life cycle: products taken apart, remanufactured, recycled and reused or the time limit of processing [44]. When green design is inserted into a product life cycle, it will be transformed into the life-cycle design.

Hence, the impacts of all stages of a product life cycle on the environment during the designing and development of products must also be considered. Life-cycle design, mainly considering environmental protection, aims at addressing the production of waste at the root and at redesigning and reanalyzing the phases of a product's life cycle. Amid designing and development, it is crucial to consider recycling, minimizing waste, enhancing durability and making it easy for dissembling and detaching. To extend the life cycle of products, consumers are the key stakeholders [45].

In addition, it is mentioned that the recycling and reuse of products and components, mostly depends on the promotion of green supply chain, and the term "reverse logistics" proposed by James R. Stock makes logistics management and green supply chain better link together [46]. In general, reverse logistics can be viewed as the reverse execution of a conventional production process.

The most accepted definition was proposed by Rogers and Tibben-Lembke [47], who considered reverse logistics as "The process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal".

Reverse logistics itself can also create opportunities for enterprise competitive advantage, does not require increased costs and liabilities [48] and it has both environmental and economic benefits [49]. In addition, relevant design standards of environmental protection have increasingly required that, before production and manufacturing, appeals to environmental protection and low carbon during the designing of products must be met. In addition, the responsibility of enterprises must be prolonged to back-end recycling [50].

In the foreseeable future, the number of people who agree with sustainable consumption will increase year over year, which indirectly affects more companies willing to apply green design considerations in the product design and development stage and have greater enthusiasm for sustainable innovative production and supply [51]. Therefore, as a tool for sustainable product design and development, product life cycle and product simplification can make the design work more convenient for design developers [52].

In recent years, studies on the product life cycle and green design have rolled out discussions from different angles—for instance, the influences of consumers exploiting the apps of social media on the product life cycle [53]; they have studied the effects of IoT and smart technologies imported into the product life cycle [54–56]; discussions the convergence of healthcare systems and product lifecycle management [57]; reference behaviors of consumers toward selection have been explored when products of green design are purchased [39]; and, under a cyclic economy, debates over the green design for products and their supply chains have been rolled out [58,59].

2.2. Kid's Toys

The term "toy" generally refers to anything that can be played with or that entertains people [60]. In Europe and the United States, a toy was originally regarded as an object, especially a gadget or machine, regarded as providing amusement for an adult [61].

It was not until the 19th century that the term toy was specifically used for children's play [62]; or an object for a child to play with, typically a model or miniature replica of something [61]. As the environment changes and the times evolve, the definition of toys will also change and the evolution process of toys can be divided into: "Ancient Toys", "Traditional Toys", "Local Toys", "Modern Toys" and "Contemporary toys"—Five Stages [63]. Therefore, users' feelings and definitions of toy products will change due to the advancement of the times and environmental changes.

Li [64] views toys as: (1) Kid's toys can help children develop physiological functions, their muscle coordination and balancing capabilities can be strengthened, and body movements can be developed by playing games. (2) Toys are beneficial to the social behaviors of children, enabling individuals to handle interpersonal relationships. (3) Toys are favorable to the cognitive development of kids. The more they engage in games, the higher the testing scores of innovative thinking they will receive. (4) Toys are conducive to the development of emotions for children, with which kids can better control their impulses. Most kid's toys are classified in accordance with the age, mentality, shapes of toys, features, materials and difficulty of operations.

Therefore, toys can not only shape the experience of children but also excite their imagination affecting behaviors during events. These factors are of vital importance [65–67]. Apart from benefits for education, educational enlightenment and recreation, toys are empowered to cure and comfort the mind. Toys for rehabilitation even boast the functions of health care and entertainment [68]. Flexible insiders may even tap into the market for people of different ages, such as sports products for a joyful family and seniors, with the materials and colors of toys consistent with natural and environmental protection [69,70].

In the development and design considerations related to kid's toys, Hsu [15], brought forward those factors required from the functions of toys, forms and shapes of games. First, the functions include (1) fostering curiosity; (2) cultivating the willingness to explore; (3) firing imagination; (4) being willing to face challenges; and (5) training the ability to express oneself. Second, the forms of games involve (1) attractive story scenarios; (2) sensory exploration and recreation; (3) additional difficulties of games layer by layer; and (4) open-ended gameplay. Finally, the shapes comprise (1) complying with physical and mental conditions; (2) echoing the styles of games; (3) colors; (4) safety; (5) extended value; and (6) serialization.

In addition, Xu [71] proposed the factors that need to be considered in toy design from the perspective of STEAM education (Science, Technology, Engineering, Art and Mathematics. The United States first proposed STEM education and later joined Art to become STEAM, looking forward to more complete learning and connect people's warmth and care.), including: (1) themes; (2) toy packaging; (3) expansibility of gameplay; (4) color matching; (5) modeling beauty; and (6) safe materials.

In recent years, the number of studies related to kid's toys has grown, demonstrating that the less discussed topics of toys are of gradual importance. Those topics cover the safety of kid's toys themselves [72,73] or the gaming behaviors and reactions in a discussion of playing with toys [74–76], and, from the perspective of consumers, purchasing or playing with kid's toys may also be studied [77–79].

2.3. Consumption Value and Behaviors

The purchasing results and value produced behind consumer behaviors often foster a causal relationship and are the core goals for marketing and consumer behaviors [80]. Consumption value can be divided into functional value, social value, emotional value, epistemic value and conditional value [81]. Though the five types are independent of each other, all of them may have an impact on consumer behaviors and on consumers' decision factors of buying commodities if the five are combined.

In general, the design of kid's toys emphasizes the functional value and epistemic value of products, with the former being the instrumental benefit and ability to satisfy relevant requirements for consumers' tasks of products [82,83]. In terms of epistemic value, they may enable consumers to be curious about the novel and unique goods, enjoy the feeling of freshness or meet their thirst for knowledge [81]. Parents must think of the social value of toys as well, as they can help consumers express their own values and establish or reinforce their relationships with others [84].

With the selling of toys being seasonal, some of them may possess high emotional value in certain cases [85]. Maslow's [86] hierarchy of needs theory extends to the value of consumption and can focus on the needs of consumers. When designing a specific category of products, the necessary functional elements must be provided to achieve higher-level needs [87].

For consumers themselves, they may show different behavior modes affected by personal, cultural, social and peer factors, with the inherent, external and marketing ones the most directly impacted [88]. For the intentions of collection from consumer behaviors, consumption for collection is the special form of consumption value, with collection including purchase, transfer, use and discarding [89].

The value of collections is different from other consumption values in that, once separated from playing with, they can be stored or utilized for decoration. Due to the deepening of collection behaviors, consumers may share the items and socialize with others. Collection behaviors may also be suspended because of practical issues of life, fluctuating prices of collections, the sense of loss failing to complete the collection and the investment bias of an investor [90].

Additionally, 90% of children aged six to ten collect toys, with the three benefits proposed by Jin [91], as follows: (1) collection is advantageous for children on cognitive development; (2) collection develops children's social skills; and (3) collection helps children foster good personalities. Therefore, collection behaviors help kids sharpen their social skills and feel a sense of social responsibility. Moreover, to collect toys can urge children to be patient and earnest.

Over the past few years, studies on consumption value have been extensively applied in miscellaneous areas, most of which involve the self-selection of consumers, including the consumption value of food [92,93]; consumers' consumption value of online tourism instructions and holiday tourism is incorporated [94,95]; the discussion of consumer behavior theory and decision-making process [96]; and, under the trend of sustainable design for products, consumers' attitudes toward the relations between green consumption value and purchase willingness are discussed [97–99].

2.4. Summary

From the above literature discussion, we know that green design is a design consideration proposed by designing for the environment and balancing the conflict between product manufacturing and the environment. Green design is also called eco-design. In terms of eco-design, there are ecological design guidelines, including ISO 14006, which are intended to support enterprises in introducing environmental management and encourage enterprises to engage in green product development. As the green design and product life cycle under the framework of sustainable development goals, it is also a promoter of sustainable development, which in turn makes enterprises more willing and enthusiastic to invest in green product development.

In particular, the reverse logistics project in the green supply chain can make enterprises not only pay attention to the aspects that should be paid attention to in product development but also promote the recycling and reuse of products and parts through efforts. Therefore, in addition to maintaining the concept of recyclability, low pollution and energy saving, green design can also reduce unnecessary waste. In the green product life cycle, solutions can be proposed at each stage of design and development in order to fundamentally solve the generation of waste.

In addition, in terms of kid's toys, in addition to having different meanings with the evolution of the times and changes in the environment. In terms of various forms of games, there is a certain promotion effect on children's brain cognition, muscle training, social interpersonal interaction and imagination development. When parents choose kid's toys, in addition to their functions, they pay attention to the safety of toys, the materials they are made of and whether they can promote children's physical and mental health.

The diversification and refinement of the toy market are the current toy design trends; however, due to this, the life cycle of kid's toy products and the environmental pollution caused by disposal are ignored. In addition, the elements of toy design should generally be paid attention to, including safety, intellectual and cognitive inspiration, gameplay, shape color and manufacturing materials. In addition, the user—the child—can decide the choice of the toy, which is often the responsibility of the parents. Thus, having parents support the purchase of toys with a green design concept is also one of the important keys to promoting companies' willingness to design and develop toys from the perspective of sustainable development.

In terms of consumer value, it can be known that consumers will generate different consumption values according to the purchase results. Including the process from purchase to use will produce different consumption values, which in turn reflects the factors that consumers decide to purchase a product. Therefore, if they have green consumption behavior, it also means that these consumers are more willing to support products with green design concepts. In addition, some consumers will decide whether to consume or not depending on whether the company fulfills its green responsibility. The consumption value related to kid's toys includes product functionality, novelty, social and situational value.

These include safety, intellectual and cognitive heuristics and social interpersonal interaction. Therefore, consumers themselves will be affected by different factors to determine the behavior of purchasing products. In addition, the relatively special consumption value will be reflected in the collection-type consumption, when the toy is out of the use function, it will have the value of collection and storage. Approximately 90% of children will have some collection behavior. However, collecting behavior is helpful to promote children's interpersonal communication, physical and mental development of skills and the improvement of careful responsibility.

Based on the above, this research takes the concept of product life cycle as the main thinking axis of kid's toy design through literature review. Through the concept of green design, this applies to all stages of the life cycle of kid's toys. Through the consumption values and behavior, the consumer value and consumer behavior factors related to kid's toys are investigated. Then, we analyze the influence of consumer purchase decision variables on the purchase behavior of green design of kid's toys and the life cycle of kid's toys. Then, the key factors are extracted as the green design decision-making factors of kid's toys.

3. Research Structure and Methodology

This study mainly introduces the concept of product life cycle regarding kid's toys and through investigation and research, obtains the design factors and purchasing decision factors of green design in the product life cycle, consumption values and behavior of kid's toys. Finally, the decision-making factors of green design for kid's toys are extracted. The following are discussed separately according to the research structure, research hypotheses, research subjects and tools and data analysis.

3.1. Research Structure

This study in terms of research structure, first confirms the research theme—that is, "Analyzing Decision-making Factors of Green Design for Kid's Toys Based on the Concept of Product Lifecycle" and then defines the research scope and subjects. Second, the literature analysis method is used to collect and analyze relevant data on green design, product life cycle, kid's toys and consumption values and behavior. Then, by expert interviews, semi-structured interviews were conducted, and materials were analyzed and summarized as the design structure of questionnaires.

At the same time, tests were launched based on questionnaire surveys on consumers who had purchased or played with kid's toys. Last, the IBM® SPSS® (V22.0) statistical software was adopted for analyzing and verifying the information, including reliability analysis, factor analysis, correlation coefficient analysis and cross analysis. As a result, the design factors and purchasing decision factors of green design for the product life cycle, consumption values and behavior of kid's toys were obtained. In combination with the mentioned research results, the decision-making factors of green design for kid's toys were generalized. Figure 2 illustrates the research structure of this study.

3.2. Research Hypotheses

According to the research purpose, questions and related literature on this research, based on three dimensions of green design, product life cycle and consumption values and behavior, the research hypotheses are proposed:

Hypothesis 1 (H1). *There is a positive correlation between green design and product life cycle.*

Hypothesis 2 (H2). *There is a positive correlation between green design and consumption values and behavior.*

Hypothesis 3 (H3). *There is a positive correlation between product life cycle and consumption values and behavior.*

Hypothesis 4 (H4). *There are significant differences in the comparison of consumer age in different dimensions.*

Hypothesis 5 (H5). *There are significant differences in the comparison of toy materials in different dimensions.*

Hypothesis 6 (H6). *There are significant differences in the comparison of the average lifespan of toys in different dimensions.*

Hypothesis 7 (H7). *There are significant differences in the comparison of disposal of disposal of discarded toys in different dimensions.*

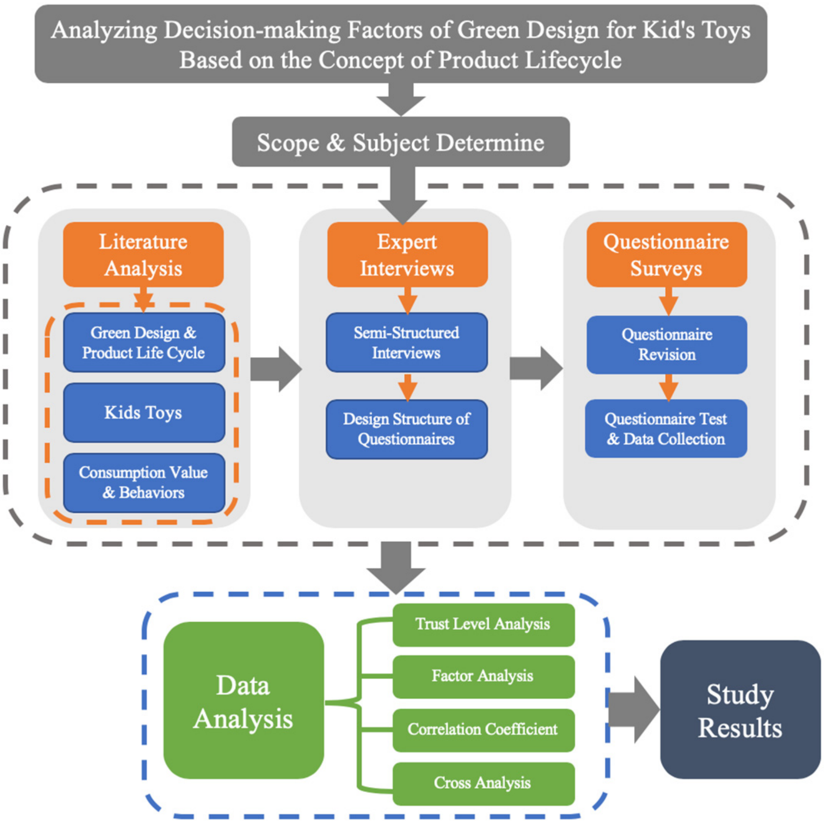

Figure 2. Research structure (Source: compiled by this research).

3.3. Research Subjects and Tools

The research subjects are mainly divided into two categories. The first category is the interviewees through expert interviews. The conditions for selecting experts were that their professional background must have green design, green innovation, environmental design or work on a kid's toy design, etc. There were four interviewees in total, including two scholars, where their backgrounds were the Institute of Environmental Engineering and Department of Resource Engineering, and their expertise included life cycle assessment, green design, green innovation, environmental engineering, etc.

The other two interviewees were designers, where their backgrounds were Lecturer of Second-Hand Toys and Commissioner of Second-Hand Toys, and their expertise included toy design and recycled design. The contents of the expert interviews were organized and used as the basis of the questionnaire design structure, and the outline of the expert interviews is shown in Table 2.

Table 2. Outline of the expert interviews.

Category	Item	Interview with Experts
Basic data of experts	A-1	Name of interviewee
	A-2	Academic background/research expertise
	A-3	Service units and main business responsibilities/teaching areas
	A-4	Job-related qualifications
Green Design and Consumption Value and Behavior	B-1	What are the key factors that consumers affect the life cycle of kid's toys?
	B-2	The relationship between the green design trend of kid's toys and consumer behavior choices?
	B-3	Will consumers be more willing to buy with green design of kid's toys?
	B-4	What kind of marketing strategies should be matched between green design and kid's toys?
Consumer Value and Behavior and Product Life Cycle	C-1	What is the current life cycle of kid's toys?
	C-2	What factors must the life cycle design of kid's toys have?
	C-3	The relationship among consumers, kid's toys and life cycle?
	C-4	What factors, conditions or principle do you think need to be in place for the life cycle design of kid's toys to complement consumer needs?

Source: compiled by this research.

The second category of research subjects was consumers who had purchased kid's toys, tested by means of questionnaire surveys. The content of the questionnaire covered three parts. The first was the basic information on the subjects; the second was questions about green design and consumption values and behaviors with regard to kid's toys; and the third was to investigate the importance of reference factors for consumers in the green design for kid's toys focused on the product life cycle. To be specific, the second and third parts of the questionnaire were mainly designed using the five-point Likert scale where the degree of agreement included strongly disagree, disagree, neutral, agree and strongly agree, each with one to five points.

3.4. Data Analysis

Data analysis of this study was divided into two phases. In the first phase, data from the expert interviews were analyzed and summarized and then taken as the subsequent design structure for the questionnaires. The second phase was the data analysis and verification after the questionnaire survey. Based on the data from valid questionnaires, the IBM® SPSS® (V22.0) was employed as a tool. The reliability, factor, correlation and cross analyses were conducted on the data collected from the returned questionnaires to validate the usability of the questionnaire. Additionally, the product life cycle of kid's toys by green design, designing elements and purchase decision factors between consumption values and behaviors were studied.

4. Results and Analysis

4.1. Descriptive Analysis of Demographic Variables

In this study, 330 questionnaires were issued online randomly, among which, 324 were valid and six were invalid, with a collecting rate of 98%. The gender of the respondents was not an excluding factor for questionnaire distribution. The 324 valid ones collected in this study were compliant with the proposition proposed by Jackson [100] that the ratio between the estimated parameters and the number of samples be greater than the standard of 1:10. As a consequence, follow-up data analyses were conducted, with the distribution of demographic variables shown in Table 3.

Table 3. Descriptive analysis of demographic variables of respondents.

Sample	Item	Number of People (n = 324)	Percentage (%)
Gender	Male	162	50
	Female	162	50
Age	Under 20	29	8.9
	21–30	206	63.6
	31–40	47	14.4
	41–50	36	11.3
	Above 51	6	1.8
Area (Taiwan)	Northern	93	28.6
	Middle	118	36.3
	Southern	110	33.8
	Eastern	3	1.3
Income (NTD)	No fixed	99	30.4
	Under 20,000	47	14.5
	20,001–30,000	48	14.8
	30,001–40,000	51	15.6
	40,001–50,000	46	14.2
	50,001–60,000	18	5.6
	Above 60,000	16	4.9
Occupation	Student	139	42.9
	Services	54	16.6
	Civil servant	40	12.3
	Manufacturing	34	10.4
	Medical care	7	2.3
	Freelance	17	5.3
	Others	33	10.2

Source: compiled by this research.

4.2. Analyses of Materials, Average Lifespan and Waste Disposal of Kid's Toys

Via the investigation into the manufacturing materials of kid's toys, the trend of toy materials was noted. As for the average lifespan, this study investigated the usage and holding status of kid's toy consumers. Furthermore, through the attitudes toward waste disposal, consumer disposal methods for discarded kid's toys could be inferred. Relevant statistical analyses are presented in Table 4.

Table 4. Analyses of materials, average life span and waste disposal.

Material	Number of People (n = 324)	Percentage (%)
Plastic	254	78.2
Metal	11	3.3
Fluff	51	15.7
Others	9	2.8

Table 4. *Cont.*

Average Lifespan	Number of People (*n* = 324)	Percentage (%)
1~2 month	42	12.9
2~3 month	74	22.7
3~4 month	19	5.8
4~5 month	10	3.1
5~6 month	4	1.3
Above 6 months	176	54.2
Waste Disposal	**Number of People (*n* = 324)**	**Percentage (%)**
General wastes	111	34.2
Resource recycling	63	19.3
Gifted to others	55	17.2
Resold	7	2.2
Placed at home	87	26.8
Returned to manufacturers for recycling	1	0.3

Source: compiled by this research.

According to Table 4, regarding the materials, plastic kid's toys accounted for 78.2% of the major manufactured ones.. This study discovered that the average lifespan of toys for most consumers was longer than 6 months, from which it could be inferred that consumers tended to purchase toys for collection. Toys for collection can also prolong the lifespan of toys, for example, dolls and educational toys.

For waste disposal, though some recycle discarded toys, this only accounted for 19.3%. An overwhelming majority of consumers, however, chose to dispose of toys as waste, which means that the mechanism for the recycling and disposal of kid's toys needs to be refined. Relevant enterprises can advocate and conduct a complete design for the mechanism, enabling consumers to be ready to recycle discarded kid's toys.

4.3. Reliability Analysis of Questionnaires

The questionnaire scale of this study took Cronbach's alpha as its reliability analysis for internal consistency, with the coefficient being greater than 0.60 [101]. Prior to the formal investigation, the items on questionnaires were tested to confirm the questionnaires' reliability and effectiveness. The items involved the basic information of respondents (eight items), their attitudes toward green design, consumption values and behaviors (10 items), as well as the green design for the product life cycle of kid's toys (23 items). Among the 30 valid questionnaires collected, all the dimensions' values of Cronbach's alpha ranged between 0.899 and 0.943, representing good reliability of the tool employed in this study.

As can be seen from the overall statistical scale, if "When purchasing a toy, I will consider whether it is collectible", "Educational toys can prolong the lifespan of toys and are collectible" and "I will select excessively packaged toys" were deleted, then the value of Cronbach's alpha went up. Therefore, the three were deleted, and the number of formal items was then 30.

Upon the preceding reliability test, 324 valid questionnaires displaying favorable reliability were collected during the formal investigation, with the value of Cronbach's Alpha ranging from 0.947 to 0.951 as presented in Table 5. After the factor, correlation and cross analyses, the design factors and purchasing decision factors of green design for the product life cycle, consumption values and behavior of kid's toys were obtained.

Table 5. Abstract of the reliability analysis.

Dimension	Cronbach's Alpha	Item Number	Number of People
Green design and consumption values and behaviors	0.949	8	324
Green design for the life cycle of kid's toys	0.948	22	

Source: compiled by this research.

4.4. Factor Analysis of the Green Design for Kid's Toys

Factor analysis was conducted by analyzing the dimensions and differences in green design for kid's toys bought by consumers to extract the factors and name those dimensions. Different dimensions and the key elements to the dimensions of green design for kid's toys for improving relevant designs were identified, with suggestions proposed at the end. To test whether the questionnaires were appropriate for factor analysis, the KMO and Bartlett analyses were conducted first.

In line with the opinions from Kaiser in 1974, in the case of the KMO value being less than 0.5, it is inappropriate to launch a factor analysis. In terms of the mediocre principle of factor analysis, the value should at least be greater than 0.60 [101]. Based on the data collected in this study, the result of Bartlett's test of sphericity suggests that the KMO value was 0.94 greater than 0.6, with the significance of 0.00 (as shown in Table 6). This result meets the prerequisite for factor analysis and represents that this set of data is appropriate for factor analysis.

Table 6. Bartlett's test of sphericity and the KMO value.

KMO Value	Approximating to the Chi-Square Test	*df*	*p*
0.940	6417.690	435	0.000

$p < 0.05$ (Source: compiled by this research).

On the tests of KMO and Bartlett, the common factor was extracted on the basis of the principal components of factor analysis, and rotation squares and the total loadings were selected, with the eigenvalue greater than 1 as the screening principle. The total variance explained was 65.451%, and the minimum eigenvalue was 2.451, greater than 1 and in compliance with the screening principle; thus, five component factors were extracted in total (Figure 3). Continuously, the maximum variance was leveraged for orthogonal rotations, with the dimensions of 30 questions condensed into five factors. To be specific, the first factor included 11 questions, the second factor included seven questions, the third factor included five questions, the fourth factor included three questions, and the fifth factor included four questions.

Among the factors of green designs for kid's toys in this study, there were 11 questions regarding the first factor related to the functional value of products, which was named the "Functional value of products". This means, of those factors, respondents believed that their willingness to pay for lightweight design was significant, including lightweight packaging, detachable toys convenient for recycling, supporting measures associated with recycling or a robust recycling system.

As for the second factor, there were seven questions about product safety and the sense of satisfaction, which were named "Requirements for safe use". This reflects that the respondents thought that safety is important for kid's toys, including the safety of games and operations and suitability of materials so that consumers may feel satisfied both psychologically and physiologically. Children may feel secure when playing with toys.

Question Number	Components 1	2	3	4	5
V37	0.699	0.166	0.174	0.116	0.189
V38	0.689	0.328	0.245	0.145	0.039
V35	0.682	0.189	0.372	0.278	0.029
V36	0.673	0.204	0.232	0.257	0.144
V34	0.647	0.137	0.404	0.397	0.008
V40	0.579	0.453	0.209	0.087	0.104
V33	0.578	0.197	0.239	0.532	0.003
V31	0.57	0.175	0.103	0.325	0.393
V32	0.568	0.171	0.119	0.453	0.307
V39	0.543	0.431	0.105	0.095	0.25
V30	0.469	0.267	0.082	0.318	0.452
V19	0.11	0.814	0.205	0.086	0.125
V21	0.277	0.806	0.173	0.033	0.086
V22	0.169	0.782	0.23	0.186	0.075
V20	0.14	0.76	0.199	0.064	0.15
V23	0.254	0.753	0.202	0.216	−0.027
V24	0.216	0.642	−0.025	0.273	0.228
V25	0.243	0.487	−0.015	0.293	0.395
V12	0.207	0.201	0.75	0.165	0.084
V14	0.066	0.085	0.741	0.34	−0.007
V15	0.243	0.231	0.731	0.158	0.201
V13	0.189	0.124	0.714	0.081	0.201
V16	0.256	0.246	0.7	0.002	0.161
V27	0.264	0.137	0.175	0.79	0.145
V26	0.289	0.188	0.321	0.721	−0.01
V28	0.283	0.272	0.137	0.719	0.113
V17	0.231	0.012	0.393	−0.51	0.634
V18	0.107	0.094	0.394	0.127	0.633
V11	0.027	0.193	0.063	0.01	0.624
V29	0.506	0.106	−0.044	0.184	0.516

Legend
1.0
0.8
0.6
0.4
0.2
0.0

Figure 3. Component matrix diagram after rotations (Data: compiled by this research).

As for the third factor, there were five questions about consumption attitudes included, named the "Cognitive attitudes toward consumption". In this case, consumers considered that green design inserted into kid's toys will stimulate people to buy despite steep prices, because of the consciousness of environmental protection and the publicity on the topic. As for the fourth factor, there were three questions concerning the lifespan of products, hygiene and the convenience for maintenance were involved, called the "Durability value of products".

Under this term, consumers might consider the service cycle and hygiene of products, such as being easy to clean and maintaining an extended service cycle. For the fifth factor, there were four questions related to the freshness and innovation in products, named the "Attitudes toward consumption decisions". This illustrates that consumers, who are affected by outer emotions and the novelty of products, may be expecting the novelty brought by green products and curious about the differences in functions, thus, raising their consumption willingness.

4.5. Correlation Coefficient Analysis of Factors Concerning the Green Design for Kid's Toys

In order to analyze green design, product life cycle and the correlations between consumption values and behaviors, correlation analyses were conducted, and five dimensions upon factor analysis were extracted. On the basis of features of factors, the analyses respectively represented: 1. green design—the functional value of products; 2. product life cycle—the requirements for safe use and durability value of products; and 3. attitudes toward consumption decisions and cognitive attitudes toward consumption.

Cohen [102] proposed a reference value for the degree of correlation represented by the value of the Pearson correlation coefficient. If there is a positive relationship between the two variables, then the correlation between 0.1 and 0.3 is low, and the correlation between 0.5 and 1.0 is high. The negative relationship can be explained in the same way. However, general researchers believe that the correlation coefficient below 0.3 is low correlation, 0.3~0.7 is moderate correlation, and above 0.7 is high correlation [103].

The correlations presented were analyzed by the data from factors. In accordance with the results of correlation analysis by Pearson, and in the correlation between green design and product life cycle, (1) the correlation coefficient between the functional value of products and durability value of products was 0.708 > 0.3 ($p = 0.00$); and (2) the correlation coefficient between the functional value of products and requirements for safe use was 0.647 > 0.3 ($p = 0.00$), with the relevant matrix shown in Table 7.

Table 7. Matrix of green design and product life cycle ($N = 324$).

	1	2	3
Functional value of products	-	0.647 **	0.708 **
Requirements for safe use	0.647 **	-	0.499 **
Durability value of products	0.708 **	0.499 **	-

** $p < 0.01$ (Source: compiled by this research).

In the correlation analysis of green design and consumption values and behaviors, (1) the correlation coefficient between the functional value of products and cognitive attitudes toward consumption was 0.6 > 0.3 ($p = 0.00$); and (2) the correlation coefficient between the functional value of products and attitudes toward consumption decisions was 0.569 > 0.3 ($p = 0.00$), with the matrix displayed in Table 8.

Table 8. Matrix of green design and consumption value and behaviors ($N = 324$).

	1	2	3
Functional value of products	-	0.569 **	0.600 **
Attitudes toward consumption decisions	0.569 **	-	0.456 **
Cognitive attitudes toward consumption	0.600 **	0.456 **	-

** $p < 0.01$ (Source: compiled by this research).

In addition, for the correlation analysis of product life cycle and consumption values and behaviors, (1) the correlation coefficient between the durability value of products and requirements for safe use was 0.499 > 0.3 ($p = 0.00$); (2) the correlation coefficient between the durability value of products and cognitive attitudes toward consumption was 0.497 > 0.3 ($p = 0.00$); (3) the correlation coefficient between the cognitive attitudes toward consumption and requirements for safe use was 0.457 > 0.3 ($p = 0.00$); and (4) the correlation coefficient between the attitudes toward consumption decisions and cognitive attitudes toward consumption was 0.456 > 0.3 ($p = 0.00$), with the matrix presented in Table 9.

From the above analyses, there were significant positive correlations between green design and product life cycle and consumption values and behaviors. In the dimensions of green design and product life cycle, a highly positive correlation was shown between the functional value of products and the durability value of products. For green design and consumption values and behaviors, a considerably positive correlation existed between the functional value of products and cognitive attitudes toward consumption. In terms of product life cycle and consumption values and behaviors, the durability value of products and cognitive attitudes toward consumption strongly correlated with the cognitive attitudes toward consumption, with the correlation paths shown in Figure 4.

Table 9. Matrix of product life cycle and consumption value and behaviors (N = 324).

	1	2	3	4
Attitudes toward consumption decisions	-	0.456 **	0.423 **	0.379 **
Cognitive attitudes toward consumption	0.456 **	-	0.457 **	0.497 **
Requirements for safe use	0.423 **	0.457 **	-	0.499 **
Durability value of products	0.379 **	0.497 **	0.499 **	-

** $p < 0.01$ (Source: compiled by this research).

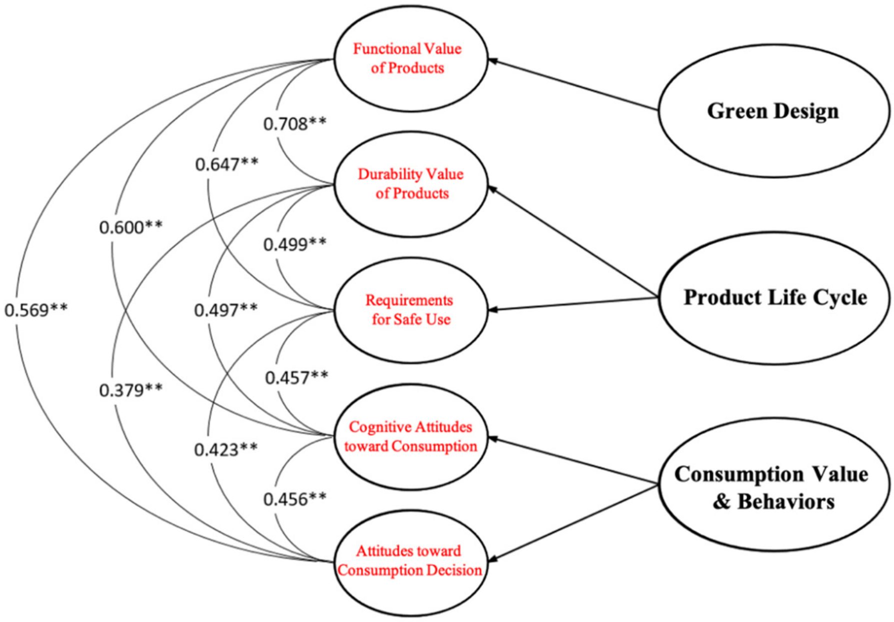

Figure 4. Correlation between green design and product life cycle and consumption value and behaviors (Data: compiled by this research, ** $p < 0.01$).

4.6. Cross Analysis of the Purchase Decisions on Green Design for Kid's Toys of Consumers

To identify the hidden correlations between green design and the life cycle of kid's toys and consumption values and behaviors, cross analyses of questions in all dimensions were conducted, and the factors influencing those dimensions were concluded. First, there were remarkable differences between the "Consumer's age" and the functional value of products (p = 0.000) in the Chi-square tests, indicating that regardless of consumers' age, they agreed on most of the values.

In particular, those aged from 31 to 40 years paid more attention to the functional value of products. The more elderly the age group, the higher degree of agreement. There were significant differences in the Chi-square test on consumers' age and the requirements for safe use (p = 0.001), demonstrating that as one grows older, his/her requirements for safe use may be higher. More than half of consumers at the age of over 21 said they might consider the requirements for safe use. Accordingly, the higher the requirements for safe use, the greater the purchase willingness of parents.

In addition, there were considerable differences in the Chi-square tests on consumers' age and cognitive attitudes toward consumption (p = 0.000). Among them, 62% and 55.3% of individuals under 20 years and from 31 to 40 years, respectively, were vulnerable to being affected by the notion of environmental protection when purchasing kid's toys. There were also great differences in the Chi-square tests on consumers' age and durability value of products (p = 0.000).

Half of the consumers over 30 years agreed that the durability value of products may affect purchase decisions, and 72.2% of those from 41 to 50 years expressed that they might consider this factor. Last, there were significant differences in the Chi-square tests on consumers' age and the attitudes toward consumption decisions as well (p = 0.002), especially those from 21 to 30 who may be impacted by consumption decisions when buying. Nevertheless, with older consumers, the influences of those decisions tended to be less, with the results of the Chi-square tests on dimensions and consumers' age as shown in Table 10.

Table 10. Abstract of the Chi-square tests on the dimensions and consumers' age.

N	Factor	χ2	*df*	*p*
324	The functional value of products	42.784	16	0.000
324	Requirements for safe use	39.146	16	0.001
324	Cognitive attitudes toward consumption	62.938	16	0.000
324	Durability value of products	62.938	16	0.000
324	Attitudes toward consumption decisions	37.195	16	0.002

$p < 0.05$ (Source: compiled by this research).

There was no significant difference between "Toy materials" and the functional value of products (p = 0.329), requirements for safe use (p = 0.351) and cognitive attitudes toward consumption (p = 0.728) in the Chi-square tests. However, between the attitudes toward consumption decisions (p = 0.019) and durability value of products (p = 0.018) and toy materials, there were significant differences, indicating that, to some extent, there was a correlation between toy materials and the preceding two factors.

Among them, plastic toys accounted for 78.2% of all toys, and 88.3% of consumers acknowledged that plastic toys themselves are durable, meaning that they will first select the plastic ones with a longer service cycle, over the plush ones. Additionally, 23.3% of consumers believed that plush toys are durable, though plastics were mostly exploited for manufacturing toys (78.2%).

For the attitudes toward consumption decisions, however, approximately 90% of consumers (88.9%) opposed toys made of plastics, which signified that the majority would not change their attitudes toward consumption decisions that consider peer behaviors or curiosity. The abstract of Chi-square tests on dimensions and toy materials is shown in Table 11.

Table 11. Abstract of Chi-square tests on the dimensions and toy materials.

N	Factor	χ^2	*df*	*p*
324	The functional value of products	26.482	24	0.329
324	Requirements for safe use	26.040	24	0.351
324	Cognitive attitudes toward consumption	19.447	24	0.728
324	Durability value of products	40.739	24	0.018
324	Attitudes toward consumption decisions	40.566	24	0.019

$p < 0.05$ (Source: compiled by this research).

There was no significant difference between the "Average lifespan of toys" and the functional value of products (p = 0.114), requirements for safe use (p = 0.730) and attitudes toward consumption decisions (p = 0.647) in the Chi-square tests. The Chi-square tests on the cognitive attitudes toward consumption (p = 0.010) and durability value of products (p = 0.021) significantly differed from that on the average lifespan of toys, which indicates that there were correlations.

For 54.3% of consumers, the service cycle of toys was longer than six months, representing that toys played with for longer than this period were loved by individuals and that these toys were seldom discarded, affected by other psychological factors. Toys with a lifespan of two to three months accounted for 22.5% and 39.8% of consumers of this type gave their consent to the attitudes toward consumption decisions; however, they also stated that their consumption decisions might be changed due to external factors. Additionally, only 31.4% of consumers approved of the durability value of products, as they believed that as a result of a high weed-out rate, they needed to stress the durability value of products. Table 12 details the abstract of Chi-square tests on the dimensions and the average lifespan of toys.

Table 12. Abstract of the Chi-square tests on the dimensions and the average lifespan of toys.

N	Factor	χ^2	*df*	*p*
324	The functional value of products	27.795	20	0.114
324	Requirements for safe use	15.780	20	0.730
324	Cognitive attitudes toward consumption	37.585	20	0.010
324	Durability value of products	34.812	20	0.021
324	Attitudes toward consumption decisions	17.099	20	0.647

$p < 0.05$ (Source: compiled by this research).

Ultimately, there was no significant difference between the "Disposal of discarded toys" and the requirements for safe use (p = 0.612) and attitudes toward consumption decisions (p = 0.353) in the Chi-square tests. Nonetheless, there were considerable differences between the part and the functional value of products (p = 0.009), cognitive attitudes toward consumption (p = 0.020) and durability value of products (p = 0.010).

Therefore, 34.3% of consumers disposed of kid's toys as general waste. We found that 44.1% of consumers of this type agreed on the functional value of products and deemed that they should be enhanced and the durability value of kid's toys increased. A total of 53% of consumers agreed on the cognitive attitudes toward consumption, and 44.6% felt that the durability value of products was of mediocre importance.

Moreover, rather than disposing of kid's toys, 26.5% of consumers chose to place them at home, and they strongly disagreed on the functional value of toys, cognitive attitudes toward consumption and durability value of products. According to the analyses above, the cognitive attitudes toward consumption of consumers who disposed of toys as general waste were positive, while those placing them at home deemed it unnecessary for changes in toys and did not care about the durability value of toys. The abstract of Chi-square tests on dimensions and the disposal of discarded toys is shown in Table 13.

Table 13. Abstract of the Chi-square tests on the dimensions and the disposal of discarded toys.

N	Factor	χ^2	*df*	*p*
324	The functional value of products	37.787	20	0.009
324	Requirements for safe use	17.629	20	0.612
324	Cognitive attitudes toward consumption	35.094	20	0.020
324	Durability value of products	46.507	20	0.010
324	Attitudes toward consumption decisions	21.771	20	0.353

$p < 0.05$ (Source: compiled by this research).

5. Conclusions and Suggestions

5.1. Conclusions

This research is focused on the concept of the product life cycle of kid's toys and discusses the green design decision-making factors. At each stage of the product life cycle, we explored adding green design to obtain green design elements of kid's toys. This included design considerations, such as safety, maintainability, cleanability, single structure, easy disassembly, easy recycling, renewable materials, lightweight packaging, the maintenance platform and the service convenience of discarded toy recycling, for kid's toys as an introduction and evaluation consideration when designing kid's toys.

From the four consumption dimensions, including the functional, epistemic, social and conditional dimensions in Maslow's point of view, consumer behaviors and collection behaviors were employed to obtain the factors influencing consumer willingness in purchasing kid's toys with green designs.

After the factor analysis of green design for toys, five factors were extracted. These are the "Functional value of products" in the dimensions of green design; the "Requirements for safe use" and "Durability value of products" in the dimensions of product life cycle; and the "Cognitive attitudes toward consumption" and "Attitudes toward consumption decisions" in the dimensions of consumption values and behavior.

Secondly, in order to analyze the correlation between green design, product life cycle and consumption values and behavior, after Pearson correlation analysis, we found that there was a positive correlation between green design, product life cycle, consumption values and behavior, and they all interact with each other related. It shows that the main points discussed in this study are included.

In particular, in the dimensions of green design and product life cycle, there is a highly positive relationship between the functional value of products and the durability value of products, showing that the function and average lifespan of kid's toys requires more attention.

In the dimensions of green design and consumption values and behavior, there is a high positive correlation between the functional value of products and cognitive attitudes toward consumption, showing that the function and consumer behavior of kid's toys requires more attention. In the dimensions of product life cycle and consumption values and behavior, there is a highly positive relationship between the durability value of products and cognitive attitudes toward consumption, showing that the average lifespan and consumer behavior of kid's toys requires more attention. Therefore, the hypotheses 1–3 of this study are all valid.

Secondly, we examined the hidden correlations between green design, kid's toy life cycle and consumption values and behavior and extracted the green design factors of kid's toys and consumers' purchasing decision factors. Therefore, a chi-square test for cross-analysis of each dimension factor and consumer age, toy materials, the average lifespan of toys and disposal of discarded toys was performed.

According to the research results, we found that there were significant differences between the ages of consumers and the five dimensions factors, indicating that the age of consumers affected the selection and purchase of toys; thus, hypothesis 4 of this study was verified. Secondly, in terms of toy materials, although there were significant differences in the functional value of products and attitudes toward consumption decisions, we also found that whether the toy materials are safe or not affected consumers' decision to buy, and hypothesis 5 of this study is still valid.

In addition, in terms of the average lifespan of toys, although there were significant differences in cognitive attitudes toward consumption and the durability value of products, we found that whether a toy has been used for a long time affected the perception of consumers, and hypothesis 6 of this study is still valid. Finally, in the disposal of discarded toys, there were significant differences in functional value of products, cognitive attitudes toward consumption and durability value of products, indicating that the function of the toys and whether they have been used for a long time affected the perception of consumers. Hypothesis 7 of this study was also confirmed.

The research results showed that, at the upper level of age, the degrees of agreement on the functional value of products and durability value of products were raised in spite of lower effects of the attitudes toward consumption decision. From 31 to 40 years old, 55.3% of consumers agreed on the cognitive attitudes toward consumption. This type of consumer, affected by the awareness of environmental protection, would purchase kid's toys of green design and deemed green brands with a safety guarantee as purchase considerations.

Accordingly, it will be more attractive for consumers to buy if the visibility of green design for kid's toys is enhanced, and brands manufacturing kid's toys with green design for packaging are advocated for. In addition, according to the analysis results, consumers in different places have different levels of environmental awareness of kid's toys. The average lifespan of toys of consumers in metropolitan areas is more than 6 months, accounting for 67.7% of all respondents.

This represents the habit of buying medium- and high-priced toys, such as regular, constructive toys, educational toys and collection-type toys with a long use cycle, and the reluctance to throw them away compared with placing them in the home to extend the life cycle of toys. By making artistic, collectible, educational, playful and maintainable kid's toys, they can be favored by more consumers and prolong the product life cycle. Additionally, companies could establish a kid's toy recycling organization; thus, toys would be able to be reused or recycled.

From the correlation analysis conducted by Pearson, there were positive correlations among factors. Consequently, cross analyses of those factors and the purchase decisions of consumers were implemented to obtain the design factors and purchasing decision factors of green design for the product life cycle, and the consumption values and behavior of kid's toys were obtained.

Finally, this study combined the above conclusions, including the five green design factor of kids toys and the three consumer purchasing decision factors. After analyzing and integrating with the previous data, the decision-making factors for the green design of kid's toys were extracted. Regarding the preceding research results, this study proposes the following eight points for the decision-making factors of green design for kid's toys:

1. Adopting non-toxic, natural or single materials to safeguard the safety of kid's toys.
2. Ensuring better and complete recycling apart from upgrading the design for maintainable and detachable kid's toys and extending the life cycle of toys.
3. Making toys that are artistic and collectible by which the value of collection will be produced and the life cycle of toys prolonged.
4. Designing toys to be more educational and less recreational and increasing the educational function related to the environment and ecology.
5. Refining the recycling institutions of toys and encouraging consumers to be ready to give the discarded toys to relevant institutions for recycling or exchange by virtue of marketing methods.
6. Highlighting green design for packaging and labeling toys meeting the standards of green design to publicize the differences between green toys and general ones.
7. Establishing green brands and raising the visibility of products and cooperating with those brands for unique and additional value.
8. Employing the topic of environmental protection to advocate the value of green design for toys and enabling consumers to meet their requirements while taking action to protect the environment.

The results of this research will further pull the kid's toy industry into the ranks of sustainable development and increase the opportunities for discussions. Solutions are also proposed for the environmental problems caused by a large number of discarded kid's toys. We encourage enterprises to invest in green manufacturing and green supply chains under the impetus of sustainable development.

Thus, in the process of designing and developing kid's toys, the concepts of product life cycle and green design are added to fulfill the green responsibility of an enterprise. In addition to supplying green design considerations for kid's toys to designers and companies, the results can also be used as an important reference with regard to the research topics regarding product life cycle and sustainable toy design and development.

5.2. Suggestions

The results of this research can be provided for designers and related industries to consider the green design of kid's toys and can also be used as a reference for research on sustainable product design. However, there are still many dimensions that deserve more in-depth discussions. Therefore, there are several suggestions for future research directions for future researchers and companies as a reference.

First of all, the relevant research on the sustainable development of kid's toys is still lacking and easily overlooked. This includes the green responsibility of toy manufacturing-related enterprises and the green behavior of consumers—in particular, this study did not conduct an internal investigation on professional toy manufacturers. These are extremely needed to further fill the gaps in the literature in this field and to ensure that kid's toys have more opportunities to be discussed under the SDGs.

Secondly, this study mainly used a large-scale quantitative questionnaire survey. We suggest that follow-up research can include qualitative interviews and practical design verification, which would make the research results more complete. In addition, both ISO 14006 and reverse logistics leading into the environmental management system involve the integration and recycling of environmental resources, and the current research literature is still insufficient; this is also worth discussing as a primary focus in the future.

Finally, this research mainly investigated the concept of product life cycle in kid's toys and explored the decision-making factors of green design. However, the assessment and inspection methods for the life cycle of kid's toys were not discussed. Regardless of design and development, manufacturing and back-end consumer strategies are related to green design and product life cycle. Therefore, in the future, relevant analysis and research can also be conducted for the introduction of product life cycles at different stages, thereby, expanding the literature on kid's toys under sustainable development.

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References

1. Guo, C.-T. The Study of the Elements of Toys Designing Based on the Viewpoint of Physical and Mental Development of Infant Children. *J. Art Des.* **2006**, *1*, 53–62.
2. Rees, W.E. Ecological economics for humanity's plague phase. *Ecol. Econ.* **2020**, *169*, 106519. [CrossRef]
3. ElHaffar, G.; Durif, F.; Dubé, L. Towards closing the attitude-intention-behavior gap in green consumption: A narrative review of the literature and an overview of future research directions. *J. Clean. Prod.* **2020**, *275*, 122556. [CrossRef]
4. Gleim, M.; Stephanie, J.L. Spanning the gap: An examination of the factors leading to the green gap. *J. Consum. Mark.* **2014**, *31*, 503–514. [CrossRef]
5. Schwepker, C.H.; Cornwell, T.B. An examination of ecologically concerned consumers and their intention to purchase ecologically packaged products. *J. Public Policy Mark.* **2018**, *10*, 77–101. [CrossRef]
6. Prospective Industry Research Institute. *2018–2023 China Toy Manufacturing Industry Production and Sales Demand and Investment Forecast Analysis Report*; Forward Business and Intelligence Co., Ltd.: Shenzhen, China, 2018.
7. Total Retail Sales Revenue of Toys in the United States from 2019 to 2021 (in Billion U.S. Dollars). Available online: https://www.statista.com/statistics/195054/total-revenue-of-us-toys-and-games-market-since-2005 (accessed on 10 May 2022).
8. Will the Future of the Toy Industry Be Plastic Free? Available online: https://www.csgtalent.com/blog/2019/09/will-future-toy-industry-plastic-free (accessed on 12 May 2022).
9. Kang, S.; Zhu, J. Total lead content and its bioaccessibility in base materials of low-cost plastic toys bought on the Beijing market. *J. Mater. Cycles Waste Manag.* **2015**, *17*, 63–71. [CrossRef]
10. Albastroiu Nastase, I.; Negrutiu, C.; Felea, M.; Acatrinei, C.; Cepoi, A.; Istrate, A. Toward a Circular Economy in the Toy Industry: The Business Model of a Romanian Company. *Sustainability* **2021**, *14*, 22. [CrossRef]
11. Li, B.; Wang, Z.; Wang, Y.; Tang, J.; Zhu, X.; Liu, Z. The effect of introducing upgraded remanufacturing strategy on OEM's decision. *Sustainability* **2018**, *10*, 828. [CrossRef]
12. Thierry, M.; Salomon, M.; Van Nunen, J.; Van Wassenhove, L. Strategic issues in product recovery management. *Calif. Manag. Rev.* **1995**, *37*, 114–136. [CrossRef]
13. Tu, J.-C.; Ko, Y.-T.; Chen, H.-C.; Chang, H.-T.; Huang, Y.-C.; Lo, T.-Y.; Hu, C.-L.; Tsai, T.-I.; Wu, P.-Y.; Kao, T.-F. *Green Design—Innovation and Design Practice*; Kico Innovation Inc.: Taichung, Taiwan, 2017.
14. Shi, T.; Gu, W.; Chhajed, D.; Petruzzi, N.C. Effects of remanufacturable product design on market segmentation and the environment. *Decis. Sci.* **2016**, *47*, 298–332. [CrossRef]

15. Hsu, T.-T. The Study of the Toy Design for Inspiring Children's Creativity. Master's Thesis, National Yunlin University of Science and Technology, Yunlin, Taiwan, 15 July 2017.
16. Monteiro, J.; Silva, F.J.G.; Ramos, S.F.; Campilho, R.D.S.G.; Fonseca, A.M. Eco-Design and Sustainability in Packaging: A Survey. *Procedia Manuf.* **2019**, *38*, 1741–1749. [CrossRef]
17. Zheng, X.; Govindan, K.; Deng, Q.; Feng, L. Effects of design for the environment on firms' production and remanufacturing strategies. *Int. J. Prod. Econ.* **2019**, *213*, 217–228. [CrossRef]
18. ISO 14006: 2020 Environmental Management Systems—Guidelines for Incorporating Ecodesign. Available online: https://www.iso.org/standard/72644.html (accessed on 18 July 2022).
19. Sanyé-Mengual, E.; Lozano, R.G.; Farreny, R.; Oliver-Solà, J.; Gasol, C.M.; Rieradevall, J. Introduction to the eco-design methodology and the role of product carbon footprint. In *Assessment of Carbon Footprint in Different Industrial Sectors*; Muthu, S.S., Ed.; Springer: Singapore, 2014; Volume 1, pp. 1–24.
20. Salomone, R.; Rupo, D.; Saija, G. Innovative environmental management tools for the agri-food chain. In *Product-Oriented Environmental Management Systems (POEMS)*; Salomone, R., Clasadonte, M.T., Proto, M., Raggi, A., Eds.; Springer: Dordrecht, The Netherlands, 2013; pp. 3–25.
21. Transforming Our World: The 2030 Agenda for Sustainable Development. Available online: https://stg-wedocs.unep.org/bitstream/handle/20.500.11822/11125/unepswiosm1inf7sdg.pdf?sequence=1 (accessed on 29 May 2022).
22. Buhl, A.; Schmidt-Keilich, M.; Muster, V.; Blazejewski, S.; Schrader, U.; Harrach, C.; Schäfer, M.; Süßbauer, E. Design thinking for sustainability: Why and how design thinking can foster sustainability-oriented innovation development. *J. Clean. Prod.* **2019**, *231*, 1248–1257. [CrossRef]
23. Geissdoerfer, M.; Vladimirova, D.; Evans, S. Sustainable business model innovation: A review. *J. Clean. Prod.* **2018**, *198*, 401–416. [CrossRef]
24. Lin, J.; Lobo, A.; Leckie, C. The role of benefits and transparency in shaping consumers' green perceived value, self-brand connection and brand loyalty. *J. Retail. Consum. Serv.* **2017**, *35*, 133–141. [CrossRef]
25. Ceschin, F.; Gaziulusoy, I. Evolution of design for sustainability: From product design to design for system innovations and transitions. *Des. Stud.* **2016**, *47*, 118–163. [CrossRef]
26. Gaziulusoy, I.; Erdoğan Öztekin, E. Design for sustainability transitions: Origins, attitudes and future directions. *Sustainability* **2019**, *11*, 3601. [CrossRef]
27. Burall, P. Green-ness is good for you. *J. Lon. Des.* **1994**, *544*, 22–25.
28. Bor, A.M.; Blom, G. *Introduction to Environmental Product Development*; Europe Design Center Ltd.: Eindhoven, The Netherlands, 1994.
29. Elkington, J. *The Green Designer*; Design Council of Great Britain: London, UK, 1986.
30. Zhang, H.-C.; Kuo, T.-C.; Lu, H.; Huang, S.-H. Environmentally conscious design and manufacturing: A state-of-the-art survey. *J. Manuf. Syst.* **1997**, *16*, 352–371. [CrossRef]
31. Agrawal, T.; Sao, A.; Fernandes, K.J.; Tiwari, M.K.; Kim, D.Y. A hybrid model of component sharing and platform modularity for optimal product family design. *Int. J. Prod. Res.* **2013**, *51*, 614–625. [CrossRef]
32. Wiley, J.A.; Benefield, J.D.; Johnson, K.H. Green design and the market for commercial office space. *J. Real Estate Financ. Econ.* **2010**, *41*, 228–243. [CrossRef]
33. Lucas, A.J.; Dyment, J.E. Where do children choose to play on the school ground? The influence of green design. *Education 3-13* **2010**, *38*, 177–189. [CrossRef]
34. Griffiths, S.; Sovacool, B.K. Rethinking the future low-carbon city: Carbon neutrality, green design, and sustainability tensions in the making of Masdar City. *Energy Res. Soc. Sci.* **2020**, *62*, 101368. [CrossRef]
35. Islam, S.; Karia, N.; Fauzi, F.B.A.; Soliman, M. A review on green supply chain aspects and practices. *Manag. Mark.* **2017**, *12*, 12–36. [CrossRef]
36. Pineda-Henson, R.; Culaba, A.B. A diagnostic model for green productivity assessment of manufacturing processes. *Int. J. Life Cycle Assess* **2004**, *9*, 379–386. [CrossRef]
37. Mastura, M.T.; Sapuan, S.M.; Mansor, M.R.; Nuraini, A.A. Materials selection of thermoplastic matrices for 'green'natural fibre composites for automotive anti-roll bar with particular emphasis on the environment. *Int. J. Precis. Eng. Manuf.-Green Technol.* **2018**, *5*, 111–119. [CrossRef]
38. Yang, Y.-C.; Zhao, X. Exploring the relationship of green packaging design with consumers' green trust, and green brand attachment. *Soc. Behav. Pers.* **2019**, *47*, 1–10. [CrossRef]
39. Hong, Z.; Wang, H.; Gong, Y. Green product design considering functional-product reference. *Int. J. Prod. Econ.* **2019**, *210*, 155–168. [CrossRef]
40. Dean, J. Pricing policies for new products. *Harv. Bus. Rev.* **1950**, *28*, 45–50.
41. Levitt, T. Exploit the Product Life Cycle. *Harv. Bus. Rev.* **1965**, *43*, 81–94.
42. Kotler, P.; Keller, K.L. *Marketing Management*, 15th ed.; Pearson Education: London, UK, 2016.
43. Terzi, S.; Bouras, A.; Dutta, D.; Garetti, M.; Kiritsis, D. Product lifecycle management–from its history to its new role. *Int. J. Prod. Lifecycle Manag.* **2010**, *4*, 360–389. [CrossRef]
44. Jun, H.-B.; Shin, J.-H.; Kiritsis, D.; Xirouchakis, P. System architecture for closed-loop PLM. *Int. J. Comput. Integr. Manuf.* **2007**, *20*, 684–698. [CrossRef]

45. Anandh, G.; PrasannaVenkatesan, S.; Goh, M.; Mathiyazhagan, K. Reuse assessment of WEEE: Systematic review of emerging themes and research directions. *J. Environ. Manag.* **2021**, *287*, 112335. [CrossRef] [PubMed]
46. Stock, J.R. *Reverse Logistics: White Paper*; Council of Logistics Management: Oak Brook, IL, USA, 1992.
47. Rogers, D.S.; Tibben-Lembke, R. An examination of reverse logistics practices. *J. Bus. Logist.* **2001**, *22*, 129–148. [CrossRef]
48. Genchev, S.E. Reverse logistics program design: A company study. *Bus. Horiz.* **2009**, *52*, 139–148. [CrossRef]
49. Goudenege, G.; Chu, C.; Jemai, Z. Reusable containers management: From a generic model to an industrial case study. *Supply Chain Manag.* **2013**, *14*, 26–38. [CrossRef]
50. Steeneck, D.W.; Sarin, S.C. Product design for leased products under remanufacturing. *Int. J. Prod. Econ.* **2018**, *202*, 132–144. [CrossRef]
51. Hall, J.K.; Martin, M.J.C. Disruptive technologies, stakeholders and the innovation value-added chain: A framework for evaluating radical technology development. *RD Manag.* **2005**, *35*, 273–284. [CrossRef]
52. Favi, C.; Marconi, M.; Germani, M. Teaching eco-design by using lca analysis of company's product portfolio: The case study of an italian manufacturing firm. *Procedia CIRP* **2019**, *80*, 452–457. [CrossRef]
53. Eslami, S.P.; Ghasemaghaei, M.; Hassanein, K. Understanding consumer engagement in social media: The role of product lifecycle. *Decis. Support Syst.* **2021**, *3*, 113707. [CrossRef]
54. Liu, Y.; Zhang, Y.; Ren, S.; Yang, M.; Wang, Y.; Huisingh, D. How can smart technologies contribute to sustainable product lifecycle management? *J. Clean. Prod.* **2020**, *249*, 119423. [CrossRef]
55. Tucker, G. Sustainable product lifecycle management, industrial big data, and internet of things sensing networks in cyber-physical system-based smart factories. *J. Self-Gov. Manag. Econ.* **2021**, *9*, 9–19.
56. Gray-Hawkins, M.; Lăzăroiu, G. Industrial artificial intelligence, sustainable product lifecycle management, and internet of things sensing networks in cyber-physical smart manufacturing systems. *J. Self-Gov. Manag. Econ.* **2020**, *8*, 19–28.
57. Sodhro, A.H.; Pirbhulal, S.; Sangaiah, A.K. Convergence of IoT and product lifecycle management in medical health care. *Future Gener. Comput. Syst.* **2018**, *86*, 380–391. [CrossRef]
58. Li, Q.; Guan, X.; Shi, T.; Jiao, W. Green product design with competition and fairness concerns in the circular economy era. *Int. J. Prod. Res.* **2020**, *58*, 165–179. [CrossRef]
59. Dey, K.; Roy, S.; Saha, S. The impact of strategic inventory and procurement strategies on green product design in a two-period supply chain. *Int. J. Prod. Res.* **2019**, *57*, 1915–1948. [CrossRef]
60. Ruan, H.-Z. The Exploration about the Relevant Factors of the Parent-Child Play's Interaction in Parent-Child Play Environment. Master's Thesis, National Taiwan Normal University, Taipei, Taiwan, 20 June 2003.
61. Julie, K. *(EDT) Oxford Chinese Dictionary: English-Chinese/Chinese-English*; Oxford University Press: New York, NY, USA, 2010.
62. Wen, M.-L. *Choosing Toys for Children*; Times Culture: Taipei, Taiwan, 1988.
63. Chang, S.-C. *Play Games*; Tailian Culture: Taipei, Taiwan, 1993.
64. Li, Y.-H. The Playability of Toys for Preschool Children. Master's Thesis, National Cheng Kung University, Tainan, Taiwan, 15 June 2011.
65. Kara, N.; Aydin, C.C.; Cagiltay, K. User study of a new smart toy for children's storytelling. *Interact. Learn. Environ.* **2014**, *22*, 551–563. [CrossRef]
66. Kara, N.; Aydin, C.C.; Cagiltay, K. Design and development of a smart storytelling toy. *Interact. Learn. Environ.* **2014**, *22*, 288–297. [CrossRef]
67. Klemenović, J. How do today's children play and with which toys? *Croat. J. Educ.* **2014**, *16*, 181–200.
68. Liu, I.-C.; Chen, C.-C. The Research of Toy Need and Market Development for the New Generation of Elderly. *J. Gero. Ser. Manag.* **2015**, *3*, 411–420.
69. Lin, Y.-T. A Century of Classic Toys in Taiwan. *J. Aes Educ.* **2011**, *180*, 50–57.
70. Shi, Y.-L. Keeping pace with the times and re-creating the vitality of the toy industry. *Econ. Tra. Insi. Biwe.* **2020**, *546*, 82–83.
71. Xu, Y.-X. A Study in the Toy Design Factors by STEAM Education. Master's Thesis, National Taichung University of Science and Technology, Taichung, Taiwan, 12 June 2020.
72. Aurisano, N.; Huang, L.; i Canals, L.M.; Jolliet, O.; Fantke, P. Chemicals of concern in plastic toys. *Environ. Int.* **2021**, *146*, 106194. [CrossRef] [PubMed]
73. Larson, D.B.; Jordan, S.R. Playing it safe: Toy safety and conformity assessment in Europe and the United States. *Int. Rev. Adm. Sci.* **2019**, *85*, 763–779. [CrossRef]
74. Isenberg, J.P.; Quisenberry, N. A position paper of the Association for Childhood Education International PLAY: Essential for all Children. *Child. Educ.* **2002**, *79*, 33–39. [CrossRef]
75. Ishibashi, M.; Uehara, I. The Relationship Between Children's Scale Error Production and Play Patterns Including Pretend Play. *Front. Psychol.* **2020**, *11*, 1776. [CrossRef]
76. Wang, X.; Takashima, K.; Adachi, T.; Finn, P.; Sharlin, E.; Kitamura, Y. AssessBlocks: Exploring Toy Block Play Features for Assessing Stress in Young Children after Natural Disasters. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* **2020**, *4*, 1–29. [CrossRef]
77. Pérez-Belis, V.; Bovea, M.D.; Simó, A. Consumer behaviour and environmental education in the field of waste electrical and electronic toys: A Spanish case study. *Waste Manag.* **2015**, *36*, 277–288. [CrossRef]

78. Richards, M.N.; Putnick, D.L.; Bornstein, M.H. Toy buying today: Considerations, information seeking, and thoughts about manufacturer suggested age. *J. Appl. Dev. Psychol.* **2020**, *68*, 101134. [CrossRef]
79. Scherer, C.; Emberger-Klein, A.; Menrad, K. Biogenic product alternatives for children: Consumer preferences for a set of sand toys made of bio-based plastic. *Sustain. Prod. Consum.* **2017**, *10*, 1–14. [CrossRef]
80. García-Fernández, J.; Gálvez-Ruiz, P.; Vélez-Colon, L.; Ortega-Gutiérrez, J.; Fernández-Gavira, J. Exploring fitness centre consumer loyalty: Differences of non-profit and low-cost business models in Spain. *Econ. Res.-Ekon. Istraz.* **2018**, *31*, 1042–1058. [CrossRef]
81. Sheth, J.N.; Newman, B.I.; Gross, B.L. Why we buy what we buy: A theory of consumption values. *J. Bus. Res.* **1991**, *22*, 159–170. [CrossRef]
82. Jung, H.J.; Kim, H.; Oh, K.W. Green leather for ethical consumers in China and Korea: Facilitating ethical consumption with value–belief–attitude logic. *J. Bus. Ethics* **2016**, *135*, 483–502. [CrossRef]
83. Hou, C.; Jo, M.-S.; Sarigöllü, E. Feelings of satiation as a mediator between a product's perceived value and replacement intentions. *J. Clean. Prod.* **2020**, *258*, 120637. [CrossRef]
84. Pillai, R.G.; Krishnakumar, S. Elucidating the emotional and relational aspects of gift giving. *J. Bus. Res.* **2019**, *101*, 194–202. [CrossRef]
85. Sweeney, J.C.; Soutar, G.N. Consumer perceived value: The development of a multiple item scale. *J. Retail.* **2001**, *77*, 203–220. [CrossRef]
86. Maslow, A.H. A theory of human motivation. *Psychol. Rev.* **1943**, *50*, 370. [CrossRef]
87. Rigby, D.; Bilodeau, B. *Management Tools & Trends 2015*; Bain & Company Inc.: London, UK, 2011.
88. Wang, Z.-J. *Consumer Behavior*, 7th ed.; Chuan-Hwa Publishing Ltd.: Taipei, Taiwan, 2021.
89. Belk, R.W. Collecting as luxury consumption: Effects on individuals and households. *J. Econ. Psychol.* **1995**, *16*, 477–490. [CrossRef]
90. Chen, F.-S. Probing into the Purchasing Motivation, Consumption Experience, Consumption Value and Collection Behavior of High-Quality Dolls-Taking Hot Toys as an Example. Master's Thesis, National Chung Cheng University, Chiayi, Taiwan, 9 July 2016.
91. Jin, F. The Value, Characteristics and Suggestions about Children's Collection Behavior. *J. Liao. Educ. Ins.* **2013**, *6*, 47–50.
92. Kushwah, S.; Dhir, A.; Sagar, M. Ethical consumption intentions and choice behavior towards organic food. Moderation role of buying and environmental concerns. *J. Clean. Prod.* **2019**, *236*, 117519. [CrossRef]
93. Rousta, A.; Jamshidi, D. Food tourism value: Investigating the factors that influence tourists to revisit. *J. Vacat. Mark.* **2020**, *26*, 73–95. [CrossRef]
94. Talwar, S.; Dhir, A.; Kaur, P.; Mäntymäki, M. Why do people purchase from online travel agencies (OTAs)? A consumption values perspective. *Int. J. Hosp. Manag.* **2020**, *88*, 102534. [CrossRef]
95. Rodrigo, P.; Turnbull, S. Halal holidays: How is value perceived by Muslim tourists. *Int. J. Tour. Res.* **2019**, *21*, 675–692. [CrossRef]
96. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
97. do Paço, A.; Shiel, C.; Alves, H. A new model for testing green consumer behaviour. *J. Clean. Prod.* **2019**, *207*, 998–1006. [CrossRef]
98. Verma, V.K.; Chandra, B. An application of theory of planned behavior to predict young Indian consumers' green hotel visit intention. *J. Clean. Prod.* **2018**, *172*, 1152–1162. [CrossRef]
99. Woo, E.; Kim, Y.G. Consumer attitudes and buying behavior for green food products: From the aspect of green perceived value (GPV). *Br. Food J.* **2019**, *121*, 320–332. [CrossRef]
100. Jackson, D.L. Revisiting sample size and number of parameter estimates: Some support for the N: Q hypothesis. *Struct. Equ. Model.* **2003**, *10*, 128–141. [CrossRef]
101. Wu, M.-L.; Tu, J.-T. *SPSS and Statistical Application Analysis*; Wu-Nan Book Inc.: Taipei, Taiwan, 2011.
102. Cohen, J. Quantitative methods in psychology: A power primer. *Psychol. Bull.* **1992**, *112*, 155–159. [CrossRef]
103. Huang, P.-H. The Relationships of Green Recruitment Practices and Organizational Attraction: The Mediating Effect of P-O Fit and the Moderating Effect of Pro-environmental Attitude. Master's Thesis, Tunghai University, Taichung, Taiwan, 28 June 2018.