

MULTIFUNCTIONAL APPAREL DESIGNING APPROACH BASED UPON ECO-FASHION DESIGN NORMS AND ZERO WASTE CONCEPT. A STUDY IN CONTEXT WITH INDIAN CHILDREN WEAR MARKET.

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ABSTRACT

In India, people are shifting from rural areas and villages to the cities and urban areas for better jobs, education opportunities and better living conditions. The rapid urbanization has increased the working population and their earnings and disposable income on trendy fashion clothing and other fashionable items. The recent rise in economic development and per capita income leads to growth, especially in the children apparel consumption. The children's apparel market is growing rapidly and thus produces a huge heap of waste and pollution. The research aims to design and develop a range of multifunctional clothes for children with recyclable materials promoting eco-fashion norms and zero waste concepts and techniques. The multifunctional children's garments and their components can be transformed and converted to use in multiple ways for different purposes and situations. The research founds that children's outfits could sustain for a long time with the adoption of zero waste concepts and multifunctional cloths also fulfil and support the objectives of sustainability.

Keywords: Children's Wear, Multifunctional Designs, Convertible Designs, Sustainability, Eco-Fashion Design, Zero-Waste.

1. INTRODUCTION

The children's wear apparel segment of the Indian apparel industry is considered as one of the most design-oriented segments. The demand for children's wear apparel is rapidly increasing as parents generally buy once every three to four months for their children. The consumption of children clothing is growing due to increase in parental income, rapid urbanization, improvement in the living standard and most important the children's awareness in today's digital age about branded clothing and asking parents to buy the garments of their like and taste. Designing multifunctional children's apparel may help in achieving sustainability goals that would further help in preserving the environment. The multifunctional children's attires could be recycled and decayed at the end of the outfit's span of life. The designing multifunctional Children's garments are various components of garments that can be put on in furthermore than one way or various different commitments by designing kid's apparels considering performing multiple functions to ensure more utilizations and thereby increasing the lifespan of the garments and minimizing disposal which would possibly provide the solution to the excessive consumption of the children's garments in the apparel industry of the countryman Eco-Fashion design norm may be outshined while designing the Children's apparels by using recyclable resources (natural and organic materials), zero waste multifunctional aspects in which an old garment can be reused and recycled and turn into a convertible attire also an outfit could be put on as a jacket with and without sleeves, as a vest shorn of sleeve, an overall pant, a pant converted into a short, a dress, lastly used as a carrier bag etc. to promote environment conservation, health concern, practical and aesthetic requirements and ensure sustainability.

2. Literature Review

In the present scenario, India is the second largest country in population, especially young and children, and has arisen as a universal centre for children's wear which led to a vast influx of domestic and multinational retailers and manufacturers. Various brands and a number of designer labels are discovering the children's outfits segment. The latest development in the Indian clothing market and industry is in a state of progression, the swing is near to organized retail from disorganized setups. ^[1]The increased demand for Children's wear apparel is due to several factors in India. The increase in the parent's income thereby uplifted the living standard in not only in the urban areas but in semi urban and rural areas of the country. Rapid urbanization and the ongoing digital era have been the cause of making children aware of branded clothing and now the days are gone when parents used to impose their likes and choice on their kids. Consequently, the demand for kid's apparel in India has increased manifold in the last two decades. ^[2]The Children's items must be developed and designed built on their real needs, creative ideas, and exclusive look and appearance in order to appeal to their attention and also fulfil their biological and psychological needs. ^[6]

The main impacts in buying conduct of garments and clothing amid 10-15 years girls and observed that parents and peer groups endorsement in consort with brand names shows a main impact. The girls in this age bracket look onward to community support for their selection of outfits. ^[4]

Colour is the most powerful factor that affects children buying behaviour so the design must be done in upbeat colours as it may generate their emotional satisfaction and pleasure. ^[8]

Many researchers found other related issues while designing children's clothing the fabrics applied in the kid's garments shall have phthalates & formaldehyde through dyeing in colors. Trims attachments should have sharp edges especially buttons should have two stitches to ensure the part is safe. For toddlers, beads & sequins are not recommended (Kids up to 2-5 years) clothing rather embroidery or any type of printing can be the feasible options. Drawstrings or cords should be avoided in children's clothing below the age of 6-7 years and Velcro, snap buttons etc. can be used in hoods in jackets. (European Std. EN14682, 2007, AND ASTM F1816-9/97). ^[12]

2.1 Eco-Fashion Norms and Zero Waste

The perception of 'Zero Waste' is related to producing items that leave no extra additional material to unwanted leftovers, and therefore minimizing the amount of waste materials from the production process that repeatedly ends up in landfill and subsequently adds to the pollution of the globe. Eco-fashion and sustainable fashion mean designing and developing fashion products by using recyclable, reusable and natural materials that can have a lesser adverse and negative environmental, ethical and social impact. ^[11]The eco-fashion and sustainability are interconnected and increase awareness among the end-users about consuming fashion apparel products that are made of sustainable raw materials in an ethical way. ^[23]Zero-waste means an item or item manufacturing procedure that eradicates waste materials. In the fashion clothing and apparel manufacturing industry, a zero-waste apparel or cloth is methodically designed to avert and eradicate wasting materials so that no fabrics and textiles are disposed of. ^[19]

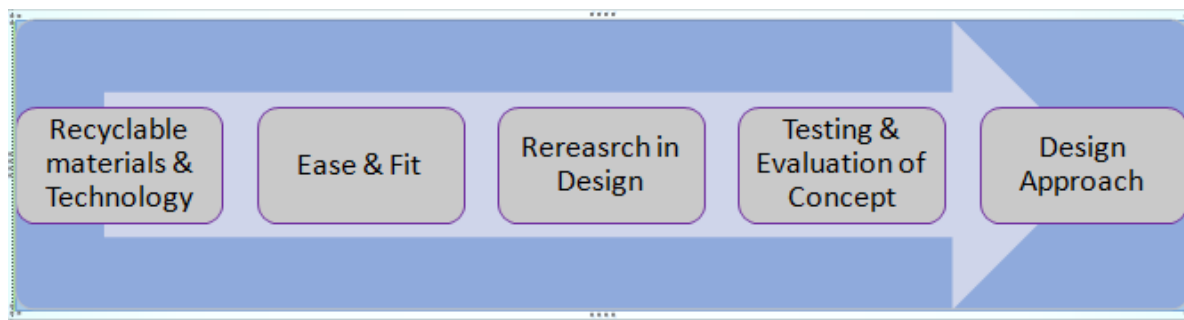
2.2 Multifunctional Garments Design

The multifunctional garments design referred to the idea of designing outfits and garments in a way that can be used and worn in multiple ways in various conditions and enhance the utility of the outfits and clothing. These apparel and garments can be transformed and converted according to the wearers' needs and can be used for performing different functions too.

The idea of multifunctional design makes attires and clothes more fascinating and outspread the lifespan cycle of the garments. The appropriate functional closures such as zippers, Velcro, buttons, snap-buttons, fasteners etc. can be used in the garments' components to assemble or disassembled the garment to give it a novel aesthetic look and comfort to the wearer.^[13]

Multifunctional garments are various components of clothes that can be worn in many ways and serve many other objectives by making garments that perform more with less, fabric straps ties, buttons, fasteners are attached to the clothes that helps in wearing them differently.^[15]

So as to develop Children's wear multifunctional garments, there are a significant number of crucial essentials that need to be contemplated in their design process. The textiles (Fabrics) sustainable raw materials and appropriate manufacturing technology significantly may contribute to the development of multifunctional garments.^[13]



Ease and Fit or comfort is mainly concerned with end-user's needs and wants that help in finalizing the concept designing, selection of materials to be used and the garment's silhouette to be developed, it is the individual insight of apparel making, which contributes to the overall all well-being of the wearer. Ergonomically fit is related to the body movement ease that enables and ensures easy body movement to be confirmed in the garment manufacturing process. Substantial design research with respect to the need of the user essentially becomes necessary to understand the latest fashion trends, consumer behaviour and their response to multifunctional garments designs and will help in selecting the appropriate raw-materials and ease specifications while designing new items for Children. The concept test & evaluation of all ideas and alternatives are extremely important to realize better results and evading common errors in creating design concepts. Finally, the prototype design is to be realized with some trials that fulfil all requirements of desired results and eventually the final formal design is to be realized and all specifications related to design, materials, etc. can be documented that would help in mass-manufacturing of the design.^[11]

3. Problem and Objectives

In the last one and a half decades, the Indian children wear apparel market has reached a value of \$16.4 billion. The Children's apparel market is predicted to rise at a Compound Annual Growth Rate of approximately 5.87% through the financial year 2026 to achieve \$ 22.53 billion by the financial year 2026. (9) /- (TSRR 2016). The Indian children's wear segment has been one of the fastest developing segments in the kid's attires and clothing of the country. The various key factors contributing to the base of the growth of Children's outfit's market segment are 375 million young individuals below the age of fifteen years in the country's huge population. In recent years strong economic growth has raised parental disposable income and their spending thereby resulting in an increase in the demand in the children's attires segment.^[17] The trends and brand consciousness in the middle-class due to rise in the organised retail outlets and presence of the mass

media like satellite TV, not only in metros and sub-metros but also in the small towns and rural areas of the country. The number of garment units produced has increased to approximately 100 billion per year, which is thirteen times more than the global population. The fashion revolution has changed consumer's buying patterns. Most consumers throw away their outfits after a few usages due to fast changes in trends and styling.^[9]

The fashion industry has been considered the second largest contributor to the industrial pollution of the most usage of materials that gives an adverse impact on the overall environment.

The research study may help in conceptualising a multifunctional children's clothing using eco-fashion design norms using zero waste concept and ensuring product sustainability and maximum usage of apparel & garments for a longer period and would bring down the cloth production and product thrown away and dumping. The study mainly aims-

1. To identify the elements of multifunctional clothing for children by using Eco-fashion norms and zero waste concept.
2. To determine the appropriate and suitable design for children's multifunctional clothing by emphasizing Comfort, Functionality, Flexibility and User friendliness.
3. To understand the end-user's (children & parents) awareness & knowledge about the concept of multifunctional garments.
4. Designing and developing a range of Children's multifunctional garments using sustainable co-friendly materials.

4. Methodology

The quantitative method of study has been used to develop knowledge about multifunctional cloths applying eco-fashion design norms and zero waste concept. All the primary and secondary related data were collected and analysis methods were used to match the research aims and objectives. The consumer's perspectives with respect to their understanding of multifunctional garments and designing with respect to the needs and latest fashion trends and styling were sought through these data collections. The collected data helped further in final product realizations. The data of consumer awareness (parents & Children) about the children's multifunctional garments, their usability, aesthetics and technical features were known via online or offline surveys with the help of a set of questionnaires, more than 62 respondents participated (online & offline) in the survey. The respondent's understanding and awareness of zero waste concept in children's garments and the necessity of eco-fashion norms in designing the garments were recorded through feedback and surveys conducted online or offline from various shopping complexes, malls etc. at last for final product range development design sketching, toile draping, initial pattern drafting, prototype development in a cheaper version of fabrics was carried out to develop desired products and good research results.

4.1 Data Analysis and Outcome

Evaluation of all collected data and other related observations was carried out and the finding outcomes showed that consumers (parents) hardly know about multifunctional garments and only limited brands are selling them. The result also shows that most Consumers are worried about excess consumption of products that adversely impact our environment and planet and want to support the concept of sustainability and shown their interest to buy more multifunctional clothes for their children provided the garments should be aesthetically beautiful and functional and can be worn easily and provide more comfort and economically within in their reach of buying. Most of the respondents were both male and male having one or two children in their family and doing shopping for their children at least three to four times a year.

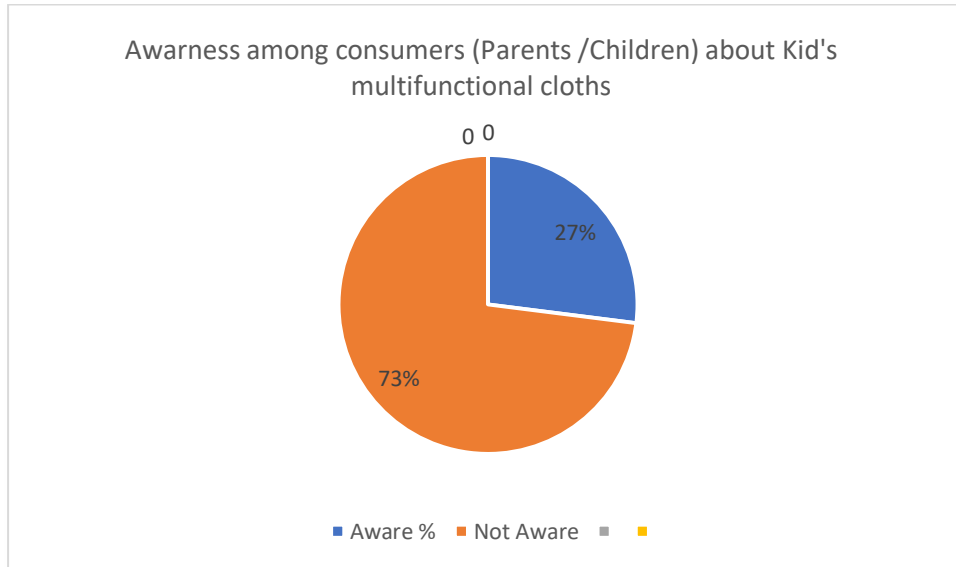


Figure 1: Percentage of Respondent's Awareness of Multifunctional Children's Clothing

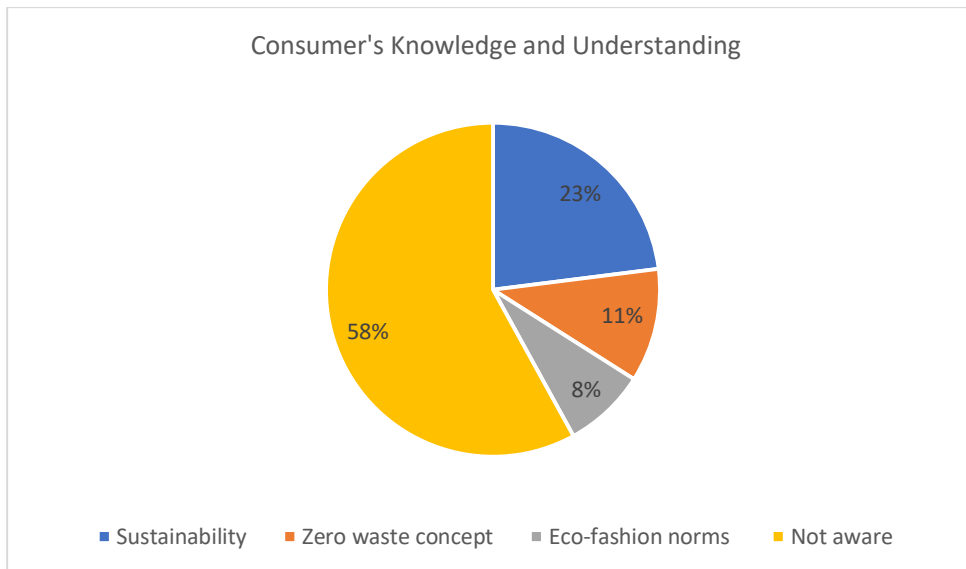


Figure 2: Percentage of Respondent's Knowledge and Understanding of Sustainability, Eco-Fashion Norms & Zero Waste Concepts in Designing Children's Clothing

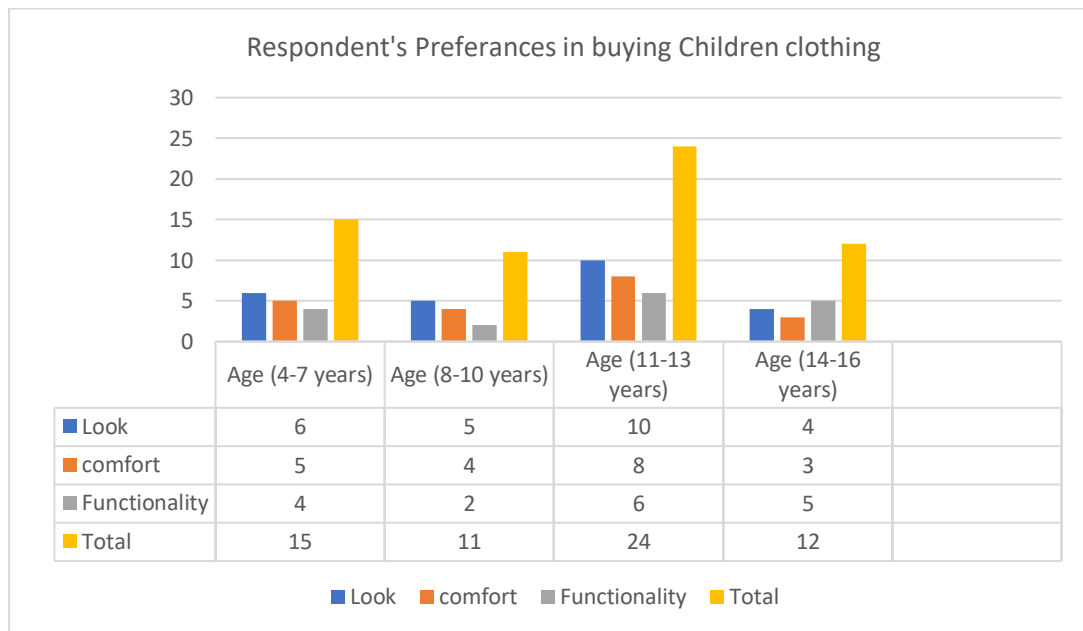


Figure 3: Shows the No. of Respondent's Preference among Look, Comfort and Functionality In The Garments While Buying Cloths for Their Children

The study outcome (Fig-3) also shows that parents and Children between the ages of 4-13 years give more importance to the aesthetic looks of the garments over comfort and functionality while the adult children and their parents choose functionality over comfort and aesthetic look and appearance of the garments in their buying. Mostly 27% of respondents have knowledge and awareness about sustainability, the concept of zero waste in fashion and Eco-fashion design norms through their reading fashion magazines, newspaper articles and the internet. The study result may help to motivate more people to buy more multifunctional clothes for their children and encourage them to contribute towards environment conservation and preserving nature and saving the planet for the future.

4.2 Range Design and Development

The product range development started with the design development process that began with the initial sketches conceived by the researcher. The conceived design ideation was transformed into the actual product realization with pattern-drafting & draping techniques, initial flat sketches with standard measurements sizes, construction details, embellishment details, trims and accessories detailing, and finally details of fabrics used in the selected final garments development was worked out. The 100% organic cotton fabrics were mainly used as shell and 100% cotton fabrics for lining in the jacket and girl's dress. The four different multifunctional for both boys and girls were designed.

Boy's (6-7 years) convertible Pant Design as shown in the (Picture-1 (A & B) provision of detachable zipper is given it is suitable for daily wear, it can be worn as pants and wear can transform into short pants as and when required by simply detaching the lower part of the pant. It was developed in 100% Organic cotton twill fabric. The Pocket bags were also made of 100% Cotton voile fabrics. A slit is also given with snap metallic buttons to make it more comfortable and provide more flexibility to the wearer. A technical drawing of the same was also prepared to give an idea about its look and

appearance to the designer before actually transforming it into the final garment.



Figure 1 :(A)

Figure 1: Detachable boy's pants can be converted into shorts by using a zipper constructed in 100% Organic Cotton fabrics

The second garment is the Girl's dress which can be worn as a dress and can be transformed into a skirt and tank top, it can be worn as daily wear attire. It is made of 100% printed organic cotton woven cambric fabric. Self fabric straps, Plastic Buttons and side-concealed zippers are used in the dress construction. The techniques of draping on the dress form were applied in giving it a final look appearance and fit. The dress is designed with lining fabric of 100% cotton voile.



A (Dress)

B (Skirt)

C (Top with Adjustable Height)

Figure 2: Girl's Dress can be worn As a Dress, Skirt, And Tank Top as Shown in Images (A B & C)

The boy's detachable long-length jacket as shown below in the picture-3, the boy's jacket can be transformed into a waist-length jacket by giving a zipper and size snap buttons. The lower panel of the jacket is detachable and can be reattached by the wearer as and when required according to the occasion or situation.



The jacket was developed with 100% organic cotton twill fabric whereas the inner lining was given of 100% cotton lightweight poplin fabric. The filling inside the jacket is also given with the cotton fibre sheet with the quilting technique. Plastic zipper, side snap buttons are also given for closure of the jacket. The garment design is unisex and can be worn by both boys and girls.



Picture: 1A (Front)

Picture: 1B (Back)

Picture: 1C (Bag)

Figure 3: BOY’S JACKET

In the above Picture 1 A, Multifunctional Girl’s Skirt designed in 100% organic cotton twill weaved fabric for a 10-12years girl, can be worn by her as a skirt and can be transformed into a Clutch -Bag to keep things into it.

Table A - Materials Details used in children’s outfits

Garment component	Fabric compositions	Remarks
Shell Fabric	100% Organic Cotton twill	Recyclables
Lining	100% Cotton poplin	Recyclables
Trims	Plastic &Metalic Zipper, MOP buttons, snap-buttons, fasteners, cotton-tapes, cotton threads	Recyclables

The complete range of four outfits for the children was developed and created based on zero waste concept by using eco-friendly recyclable materials. The leftover waste fabric cuts were used in the Top’s and dress’s straps and strings. In apparel’s construction, CAD pattern making and draping techniques were applied to avoid unnecessary wastages in the construction process.

5. CONCLUSIONS

The aims of the research would be designing and exploring a range of multifunctional children's clothing by transforming different garments with different functions and properties. Different techniques will give versatility to design conversion and design flexibility. The multifunction design approach will encourage people to reuse, and recycle garments instead of throwing them away.

To enhance the garment's flexibility, functionality, user-friendliness characteristics, various designing techniques may be applied such as garment draping, panelling, and folding etc. Suitable clothes for various occasions and functions can be designed with the latest fashion and trends. The convertible and detachable garments will provide many options to the consumer to stylize their clothes as per their functional property. The problem of wastage can be resolved by the wearer by mix-matching the multifunctional garments in different styling.

Multifunctional children's garments could be recycled and brought again into the economic system back instead of overthrowing and minimizing landfill space area, and carbon footprint on the planet, and have an affirmative outcome on the environment and our coming future. The eco-fashion design norms will help the garment designing team in identifying the recyclable, reusable and less harmful materials that cause less harm to the nature and environment. Fashion designers should focus on using recyclable, reusable materials in designing multifunctional clothing for children. The fast fashion brands and their manufacturers should focus on designing multifunctional cloths in their wide product assortments and educate and motivate their product's end users about sustainability and environmental protection.

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REFERENCES

1. Prakash M., Ambica, Tripathy V.M., Chaturvedi Nishant. ISSN : 0731-6755, Volume XII Issue IX SEPTEMBER 2019
2. Das and Avik (22.8.2019). "Children's now Change Clothes up to four times in a day" Times Business. Times of India. Pp11.
3. Jill Ross, Rod Harradine. (2004), I'm not wearing that: Branding and young children. Journal of Fashion Marketing and Management: An International Journal.8(1).pp. 11–26.
4. Isabel J. Grant, Graeme R. Stephen (2005).Buying Behaviour of teenage girls and key societal communicating factors influencing their purchasing of fashion clothing. Journal of Fashion Marketing and Management: An International Journal. 9(4), pp: 450–467
5. Pandya, Mehal (2016). Consumer buying behaviour for children apparel: A critical review, international journal of Management,7 (5),pp 188-199.
6. Riddle, L. &Koksal, M.H., Consumer behaviour and preferences regarding children's clothing in Turkey, International Journal of Fashion Marketing and Management. , 11(1), pp. 1-12, Mar. 2007.
7. Bezerra, G., Carvalho, M., Rocha, M. &Xu, B. Anthropometry for children's clothing: difficulties and limitations, IOP Conference Series: Materials Science and Engineering, pp. 1-8, 2017.

8. Radeloff, D.J., Psychological types, color attributes, and color preferences of clothing, textiles, and design students, *Clothing and Textiles Research Journal*, **9**(3), pp. 59-67, Mar. 1991.
9. TECHSCI RESEARCH REPORT 2016
10. Nadia Rosli (2018). Today's trends, tomorrow's trash. *New straits Times*.
11. <https://www.nst.com.my/lifestyle/pulse/2018>.
12. IBRAHIM M.S.R. & Md. Tajuddin (JSSH) vol.5 no. 1, 76-87 April 2021 "Zero waste concept in Multifunctional clothing.
13. Jalil M.H. and Shaharuddin S.S. *J.Vis. Art & Des.* Vol. 13 No. 1 35-47 multifunctional Children Cloth design On Eco Fashion Design Model 2021.
14. Cunha, J. & Broega 2009, A. *Designing Multifunctional Textile Fashion Products*.
15. Autex 2009: 9th World Textile Conference, pp. 1-10, 2009.
16. Koo, H.S., Dunne, L. & Bye, E., *Design Functions in Transformable Garments for Sustainability*, *International Journal of Fashion Design, Technology and Education*, **7**(1), pp. 10-20, Jan. 2014.
17. Gong, M & Rahman, O *Sustainable Practices and Transformable Fashion Design—Chinese professional and Consumer Perspectives*, *International Journal of Fashion Design, Technology and Education*, **9**(3), pp. 233-247, Sep. 2016.
18. Farr, Gam, H.J., Cao, H., C. & Kang, M., *Quest for the Eco-apparel Market: A Study of*
19. *Mothers' Willingness to Purchase Organic Cotton Clothing for Their Children*,
20. *International Journal of Consumer Studies*, **34**(6), pp. 648-656, Nov. 2010.
21. P. Poaps & Kang, J. and Park-Poaps, H. (2010), "Hedonic and utilitarian shopping
22. motivations of fashion leadership", *Journal of Fashion Marketing and Management*,
23. Vol. 14 No. 2, pp. 312-328.
24. GUPTA L. & Harminder K.S. 2020: *Achieving sustainability through zero waste Fashion A review DDJM, PAU, Ludhiana India.*
25. Ross, C. *What is zero Waste fashion design is all about.* 26 December Edition 2017.
26. HOGLAND, W., Jani, Y., Hogland M., et al (2017): *Beyond the zero-waste concept.*
27. Hills, C. Gordon, 2015, *Sustainable fashion, Present, Past, & Future*, Bloomsbury London, United Kingdom 2015.
28. Hethron & Ulasewicz (2015), *Sustainable Fashion: Why now? A conversation exploring issues, practices, and possibilities*, Fairchild books Inc, New York, p. 207-232
29. E. KABUKCU, E. M. ENSARI, *Eco-Concepts & Ethical Issues In Sustainable Fashion*
30. *Industry: Bemateks-Kids Fashion*, Vol. 5 No.-6, March 2016.