MANUFACTURER'S PERSPECTIVE ON INCLUSIVE DESIGN DRIVERS AND BARRIERS – DEVELOPING COUNTRIES CASE

Amjad Hussain
Department of Industrial and Manufacturing Engineering
University of Engineering and Technology Lahore
54890, Pakistan
chamjad@gmail.com

Aftab Ahmad
Department of Industrial and Manufacturing Engineering
University of Engineering and Technology Lahore
54890, Pakistan
Engr_aftabahmad@yahoo.com

Keith Case
Mechanical and Manufacturing Engineering

Loughborough University
Leicestershire, UK
LE11 3TU
k.case@lboro.ac.uk

P John Clarkson
Department of Engineering
Engineering Design Centre
University of Cambridge
Cambridge, UK
CB2 1PZ
Pjc10@eng.cam.ac.uk

Tariq Masood
Department of Engineering
Institute for Manufacturing
University of Cambridge
Cambridge, UK
CB3 0FS
Tm487@cam.ac.uk

Samia Khanum Anwar
Lady Aitchison Hospital
King Edward Medical University
Lahore
Pakistan
Samia_ch23@yahoo.com

ABSTRACT

Inclusive Design aims to ensure that the design needs of the largest possible audience are addressed. Developing countries contribute about 41% of the global population and the percentage of older people and people with disabilities is increasing, which further highlights the need for an inclusive design approach. This discusses the demographics and the need to consider the design needs of this large segment of the world population. Exploration of drivers and barriers to inclusive design are identified so that strategies can be devised to promote drivers and remove barriers. This ongoing research will be based on a survey that will be used to collect manufacturer's perspective on these issues. Data analysis will provide an opportunity to understand the manufacturer's perspective and how understanding and awareness can be increased. This research will improve the lives of people in developing countries and will highlight business opportunities for local and international manufacturing companies.

Keywords: Inclusive Design, Drivers and Barriers, Manufacturing, Developing Countries

1   INTRODUCTION

Inclusive design aim to address the design needs of the largest proportion of population where special consideration is given to accommodate older and people with disabilities along with the rest of the population in a single design solution. The percentage of the older population is increasing throughout the world; however, this trend is quite prominent in developed countries like US, UK, Australia, Japan, Canada and Germany because of the availability of better living facilities, medical treatment and healthy working environment (U.N.O., 2009). On the other hand, in developing countries, the average age of the population is lower than that of developed countries; however, they constitute a

significant proportion of the overall world population. It has been noticed that previously attention has been given to assessing the level of awareness and exploring drivers and barriers for the promotion of inclusive design approach in product, process, environment and service design in developed countries like the UK, US and Japan. In spite of the challenging demographics of developing countries considered as the main contributors to the world population, no effort has been made to increase the level of awareness of the inclusive design approach, to explore and highlight the drivers and barriers in the implementation of this design approach with reference to the perceptions of manufacturers in these countries. This research is an effort to contribute in this respect by finding manufacturer's perspective on the implementation of inclusive design method.

2   LITERATURE REVIEW

2.1   Demographics

The total population of many countries is increasing; however; this trend is quite significant in developing countries like China, India, Pakistan and Bangladesh, where the population of these four countries is about 42% of the world population, as shown in figure 1. In the same way, these countries living population contains a significant proportion of older (37% of the world population, figure 2) and disabled people (6% of the world population) (CIA World Fact Book, 2014). These statistics clearly highlight need for the implementation of an inclusive design approach to these countries as their contribution to the world population is quite significant.
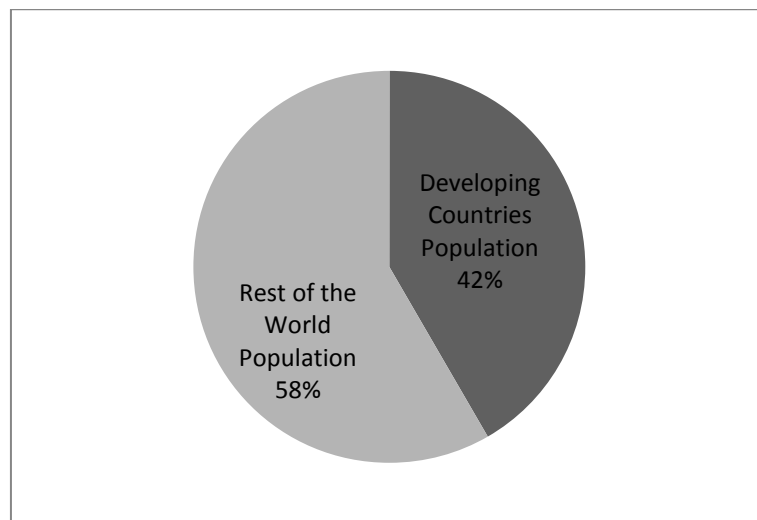

Figure 1: Comparing total world population with developing countries population (China, India, Pakistan and Bangladesh)

Developing
Countries
Older
Population
37%

Rest of the
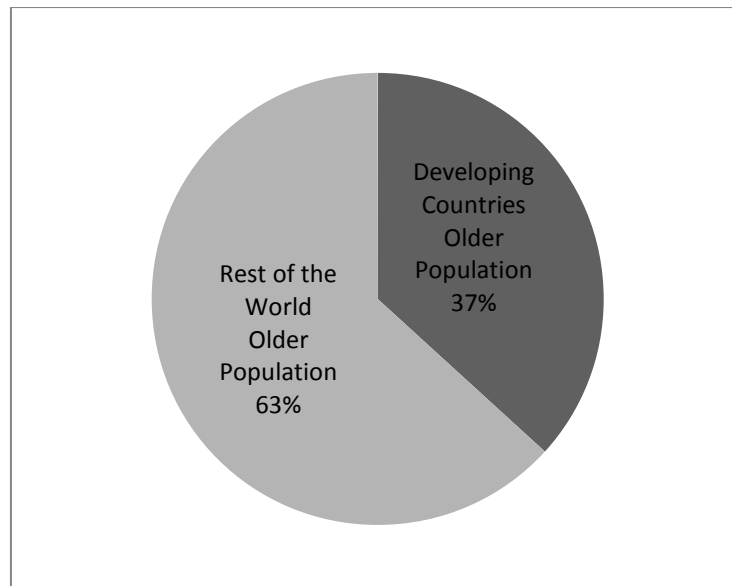World
Older
Population
63%

Figure 2: Comparing total world older population with that of developing countries (China, India, Pakistan and Bangladesh)

In general, it's clear from the global demographics that older people and people with disabilities are a considerable proportion of the world population, and this justifies financial as well as legislative incentives for including these groups in the design of products, environments and services (Coleman, 2001). However, trends of this demographic change are different in different parts of the world. For example, the overall percentage of older workers is increasing in the majority of the developed countries and this justifies the need for their accommodation in the design of products, processes, environments and services. However, in the developing countries scenario, the same increase in prominent as the overall population of these countries is growing very quickly and the proportion of older people and people with disabilities is increasing accordingly. These facts draw the attention of designers, ergonomists, engineers, psychologists, planners and entrepreneurs to seriously think about the provision of healthy living conditions to this significant proportion of the world population. The following sections describe how these challenges can be met by design scenarios that are equally acceptable for the broadest range of population and identifies the drivers and barriers in the promotion of these.

2.2   Inclusive Design – Drivers and Barriers

 "Design is the process of converting an idea or market need into the detailed information from which a product or system can be made" (Royal Academy of Engineering, 2005).

The British Standards Institute (2005) defined inclusive design as "The design of *mainstream* products and/or services that are accessible to, and *usable* by*, as many people* as reasonably possible ... without the need for special adaptation or specialised design". Later on, the inclusive design term was also referred to providing quality of life and independent living for the ageing population (Waller 2009). We may say that the approaches like 'Inclusive Design', 'Universal Design', and 'Design for All' have been developed to help the designers in developing design strategies that can promote design scenarios that are equally acceptable for all, including older people and people with disabilities (Preiser *et al.* 2001; European Institute for Design and Disability, 2006; Keates *et al,* 2004).

Published literature shows that previously some efforts have been made to explore the drivers and barriers for inclusive design. There have been studies conducted in different parts of the world that identify some of the drivers and barriers of inclusive design. Vanderheiden (2000) conducted telephone interviews of 26 consumer product manufacturers in US and identified a range of barriers and motives like government regulation, market data, training, consumer demands, technical complexity and unavailability of highly relevant knowledge, data and techniques. A similar kind of survey was conducted in Japan where 307 companies from different industrial categories were

selected for the survey. Interestingly, Japanese companies also provide results that are similar to US companies (Unpublished report, 2000).

In the UK, Keates et al. (2000) found that few industries knew about inclusive design and that there was a misconception about the fundamental understanding of this design method. Companies believed that inclusive design meant designing only for older people and people with disabilities. In another survey conducted by Sims (2003) at Loughborough University, 32 design professionals working with different types and sizes of companies, were surveyed and it was concluded that 'design for all' is widely known but unfortunately not practised within the design community. The majority of designers were aware of the philosophy of 'design for all' but rarely considered the approach because of the perceived time and financial costs. Underwood (2003), and Bellerby (2003) also discussed how inclusive design methods can be promoted and design related issues could be addressed. They suggested that the provision of guidelines and standards could be important drivers, as currently these are not presented appropriately. Moreover, legislation and brand imaging can also play an effective role as generic business drivers.

Later on, Dong et al. (2004a and 2004b) conducted a more comprehensive study with SMEs, where a survey was carried out with 38 manufacturing and retailing companies, along with 35 design consultancies. It was concluded that different companies perceive different factors as major barriers. However, drivers within these groups were found to be the same. For example, manufacturers and retailers mentioned key barriers because of the assumptions that inclusive design is more expensive, difficult to practice and learn and time consuming. In 2006, Goodman et al. (2006) unlike Dong et al. (2004a, 2004b), targeted large organizations along with SMEs and used a survey method for getting a more detailed insight about the drivers and barriers for inclusive design and used the same questionnaire for comparison purposes. Complete responses were collected from 101 UK companies and organizations and a detailed analysis was carried out. Barriers most frequently identified were a lack of time and budget for supporting inclusive design, lack of knowledge and tools to practice it, and not perceived as the need of the end users. Moreover, the perception that there is no justifiable business case for inclusive design was considered extremely important by most of the respondents; whereas, it was not the most common identified barrier.

As mentioned earlier, the population of developing countries is growing rapidly and the proportion of older and disabled people is also increasing accordingly. There are important questions as to how the living standards and quality of life of these people can be improved and maintained. Currently, in these countries the needs of older people and people with disabilities are not considered sufficiently by designers, planners, architects, and ergonomists. It is critically important to create awareness for policy-makers, planners, manufacturers and designers about the importance of the inclusive design approach for creating environments, products and services that meet the diverse and changing needs of the whole population, including older people and people with disabilities.

3   RESEARCH FOCUS

The main focus of the research is to assess the level of awareness about inclusive design in developing countries like China, India, Pakistan and Bangladesh as a significant proportion of the world population is living in these countries. Up till now, no research has been conducted in these countries about exploring the main drivers that can motivate manufacturers and barriers that are potentially the reasons for lack of interest and resistance to its promotion. This is potentially a huge market where manufacturers can draw benefit by implementing design solutions that are equally acceptable for a wide range of population. An underlying purpose of the research is to give awareness to the manufacturers about the inclusive design approach so that manufacturing industries in this part of the world can create business opportunities by attracting older customers and customers with disabilities along with the rest of the population.

4   RESEARCH METHOD

For this study, a large scale survey of manufacturers will be carried out in developing countries (China, India, Pakistan and Bangladesh). The main objective of the survey is to identify barriers and drivers for inclusive design in manufacturer's perspective. Initially, a list of manufacturing companies will be prepared and then it will be finalized after telephone inquires about their willingness to

participate in the survey. The survey questionnaire has been designed with reference to the method adopted by the Engineering Design Centre's survey at the University of Cambridge. A pilot survey will be carried out to assess the reliability of results. Prior to final distribution, a revised questionnaire will be developed. After receiving responses from manufacturers, a detailed descriptive statistical analysis will be carried out. However, further investigations will be carried out by using t-test (for finding difference in responses from different countries) and finally factor analysis for having a deep understanding of relationships between different barriers and drivers.

5   FUTURE WORK

Future work will focus on conducting a pilot survey in Pakistan where the opinions of manufacturing and design experts from manufacturing companies will be requested. In the meantime, a detailed list of manufacturers from all these countries will be prepared and telephone contact will be made for winning their willingness to participate in the survey. A redesigned survey questionnaire will be sent to the relevant persons in the companies via e-mail or post, keeping in view the ease of respondents. After data collection, data analysis will be carried out to list the barriers and drivers to inclusive design, on the basis of their level of significance. Moreover, during this research exercise, efforts would be made to educate the manufacturers about the importance of inclusive design and its relevance to human well-being along with potential business opportunities for them.

6   CONCLUSION

Changing demographics demands the promotion of the inclusive design method throughout the world. However, developing countries like China, India, Pakistan and Bangladesh make a major contribution to the world population and the overall population in these countries is increasing with the proportion of older people and people with disabilities is increasing accordingly. This article reveals the need for exploring the main barriers and drivers for inclusive design from a manufacturer's perspective so that drivers can be promoted and barriers can be removed. This research will contribute in terms of promoting a better understanding about the inclusive design approach and this will ultimately help designers in designing products, services, processes and environments that are equally safe, healthy, productive and acceptable for a wide range of population. The aim is to achieve an improvement in living conditions of older people and people with disabilities along with the rest of the population, while developing a business case for manufacturers as these countries constitute a huge potential market of product consumers.

REFERENCES

Bellerby, F., and G. Davis. 2003. Defining the limits of inclusive design, *Include 2003*. Royal College of Art, London, 1:00–1:17.

British Standards Institute. 2005. *British Standards 7000-6:2005. Design Management Systems – Managing Inclusive Design – Guide*.

Chimbuya, A. 2008. *Barriers to adopting Inclusive Design*. Carleton University School of Industrial Design, IDES 4001 Seminar Research Paper.

CIA World Fact Book <www.cia.gov/library/publications/the-world-factbook/>

Coleman R. 2001. Designing for our future selves. In: *Universal Design Handbook*, ed. W. F. E. Preiser and E. Ostroff, New York : McGraw-Hill, 4.1-4.25.

Coleman R., H. Dong H and A. Topalian. 2006. The business case . In: *Design for Inclusivity*. Hampshire, UK: Ashgate Publishing Ltd.

Dong, H., S. Keates and P. J. Clarkson. 2004a. Inclusive design in industry: barriers, drivers and the business case. In: *8th ERCIM Workshop "User Interface for All"*. Vienna, Austria.

Dong, H., P. J. Clarkson, S. Ahmed and S. Keates. 2004b. Investigating perceptions of manufacturers and retailers to inclusive design. *The Design Journal* 7:3-15.

European Institute for Design and Disability. `<www .design-for-all.org>`

Goodman J., P. J. Clarkson and P. Langdon. 2005. Developing Tools for Communicating Inclusive Design Principles . In: *Promoting User Sensitive Inclusive Design: Strategies for Communicating User Needs to Designers* , Workshop at ADDW, Dundee , UK.

Goodman, J., H. Dong, P. Langdon and P. J. Clarkson. 2006. Increasing the uptake of Inclusive Design. In industry. *Gerontechnology* 5(3):140-149.

Keates, S and P. J. Clarkson. 2004. Countering design exclusion: An introduction to Inclusive Design. London: Springer.

Preiser, W. and E. Ostroff. 2001. *Universal Design Handbook*. New York: McGraw-Hill.

Panayiotis Z, S. Helena and P. Ulrike. 2008. *Inclusive Design For Older People*. Centre for HCI Design City University London, London, UK.

Royal Academy of Engineering. 2005. Educating engineers in design <www.raeng.org.uk>

Sims, R. E. 2003. *'Design for All': Methods and Data to Support Designers.* PhD Thesis, Loughborough University, Loughborough, UK.

Underwood. M. and D. Metz, D. 2003. Seven business drives of inclusive design. In: *Include 2003*. 1:39–1:44.

U.N.O. 2009. Ageing `<http://social.un.org/index/Ageing.aspx>`

Unpublished report. 2000. *Kyoyo-hin (Universal Design) in Japan*. Available from the i~ design collection, Helen Hamlyn Research Centre, Royal College of Art, UK.

US Census Bureau. 2014. International Data Base (ID B); census.gov/population/international/data/idb/informationGateway.php [accessed March, 2014].

Vanderheiden G. and J. Tobias. 2000. *Universal design of consumer products : current industry practice and perceptions*; 2000: http://trace .wisc.edu/docs/ud_consumer_products_hfes2000/index.htm; [Accessed June 2, 2006].

Waller, S. and P. J. Clarkson. 2009. Tools for inclusive design. In: *The Universal Assess Handbook*, ed. C. Stephanidis, Taylor and Francis, Boca Raton, FL.