Design for Sustainability – Learning from Traditional Indian Products and Practices

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Abstract. Mainstream design approaches for developing more sustainable ways of living are often underpinned by the very modern values that have been instrumental in creating our unsustainable world. These values include those of consumerism, economic growth, efficiency, and technological optimism – exemplified by mainstream Triple Bottom Line approaches, including the popular Circular Economy concept. Mounting evidence of unsustainability, however, suggests that such approaches may not be sufficient to bring about the scale of change required. We present initial findings from an ongoing research project that examines what Design for Sustainability can learn from traditional products and practices in India that are not underpinned by modern values. We focused on one traditional product, the mortar and pestle, comparing it with a contemporary spice grinder. We offer five initial findings for developing contemporary products in a more comprehensive and holistic manner than is currently the case.

Keywords: *design for sustainability; meaningful future; traditional practices and products.*

1 Introduction

Increasingly, design is being recognized as an important activity for supporting the transition towards sustainability. Accordingly, contributions to Design for Sustainability have surged over the past two decades, strengthening the theoretical and philosophical foundations of the field [1-6]. Approaches such as the Triple Bottom Line (comprising economic, social and environmental concerns) and the Circular Economy have gained the most traction, but they are problematic for their eco-modern focus on technological advancements that aim to improve efficiency and support economic growth [7]. Moreover, many of these approaches do not address over-consumption and only seek to reduce unsustainability. However, as Ehrenfeld [8] suggests, reducing unsustainability will not result in sustainability and eco-modern approaches are 'part of the problem, not the solution: they all will fail sooner or later and, worse, shift the burden away from more fundamental actions.' Walker [9] also criticizes eco-

modern approaches to Design for Sustainability as 'being too impersonal to address sustainability substantively' and instead proposes a Quadruple Bottom Line (QBL) model for sustainability. The QBL builds upon Elkington's [10] Triple Bottom Line by adding the concept of 'personal meaning, a concept which encompasses a broad range of understandings and practices that are congruent with deeper values and profound, meaning-seeking aspects of our humanity' [11]. QBL therefore challenges design approaches that are deeply rooted in consumerism, economic growth, efficiency, and technological optimism. For Walker [12], the addition of 'personal meaning' is necessary because the current idea of sustainable development only promotes a partial solution because while it addresses important issues such as environmental stewardship, social justice, and economic security, it often lacks ideas that nurture and develop the inner person. QBL comprises:

1. Practical Meaning: providing for physical needs while ameliorating environmental impacts;
2. Social Meaning: ethics, compassion, equity, community;
3. Personal Meaning: conscience, spiritual well-being, questions of ultimate concern;
4. Economic Means: financial viability but not as an end in itself [13].

Aligned with QBL, Walker suggests that design could learn valuable lessons from traditional knowledge and practices rather than relying solely on modern knowledge [11].

Traditional practices are a combination of knowledge, experience, tradition, places, locality, skills, practices, theories, social strategies, moments, spirituality, history, heritage, and more [14]. Such practices are obtained incrementally, tested by trial-and-error and transmitted to future generations orally or by shared practical experiences and cultural transmissions [15]. The importance placed on life-long, balanced, and experimental learning fulfils basic needs based on natural laws, where everything in nature, including humans, enjoys equal status [16]. Traditional knowledge and practices help to form the basis for making decisions and developing strategies for many practical aspects of life, including the interpretation of meteorological phenomena, medical treatment, water management, production of clothing, navigation, agriculture and husbandry, hunting and fishing, food preservation and preparation, use of materials as well as classifying biological systems [17]. Moreover, many traditional practices that have been part of people's lives for centuries continue to be a part of everyday life today, for example, the mortar and pestle made of stone is still in wide use around the world since the Stone Age without or with

minimal changes in its design [18,19]. This paper therefore argues that Design for Sustainability can learn from enduring traditional knowledge and practices, which are often highly valued for their ecological attributes, connection to localization, exemplification of systemic thinking, and relationship to authentic notions of being [20].

2 Methods

The focus of this paper is one traditional product that is still is in widespread use today: the mortar and pestle. We compare the mortar and pestle with a contemporary electric spice grinder to draw conclusions about their relationship to sustainability (Figure 1). We then examine and compare the electric spice grinder and the mortar and pestle using the theoretical lens of Walker's QBL [11]. We do this because 'by using this lens, the worldview so reliant upon rationalization, objectivity and scientific approaches can be challenged and a more meaningful and ultimately sustainable paradigm for design can emerge that embraces rational and intuitive thinking; objectivity and subjectivity; detailed analytical approaches and more holistic synthetical approaches' [21].

The example of the mortar and pestle is a component of a larger research study concerned with identifying a broad range of Indian traditional products and practices and comparing them with their modern counterparts to draw out implications for sustainability. These products and practices include kitchen utensils, food serving, furniture, and some examples of traditional services, which are summarized in Table 1. This research adopted a constructivist approach, combining theoretical understandings of design for sustainability with empirical research, which has evolved from the researchers' personal and professional experiences while working in the handicraft sector in India. This exploratory study adopted the case study method, as it allows to understand a complex issue and multifaceted understanding of real-life context to generate in-depth understanding. [22]. This method allowed to ask 'what'/'why' questions to examine traditional products and practices, and by asking 'how' question has helped to formulate findings of the case study [23].

Table 1 Traditional products and practices being examined.

Kitchen Utensils

(1)
Churner – *madani/ghotni/phirni*

(2)
Winnowing basket – *muram*

Food Serving

(3)

Biodegradable leaf plates

(4)

Terracotta water container

Furniture

(5)

Traditional woven bed – *charpai/khat*

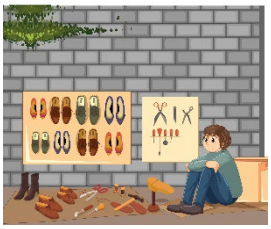
(6)

Roadside wicker furniture

Services

(7)

Water stations – *panpoi*



(8)

Cobbler – *mochi*

3 The Mortar and Pestle: Case Study Findings

The mortar and pestle is an example of a domestic tool that has stood the test of time, as it has existed since the Stone Age, yet is still in widespread use around the world today. Most people who live in rural villages in India largely depend on basic energy saving techniques and handmade local equipment to prepare their everyday meals, such as *pata varwanta* (handmade grinding stone and rolling pin) and *sil batta* (handmade mortar and pestle).

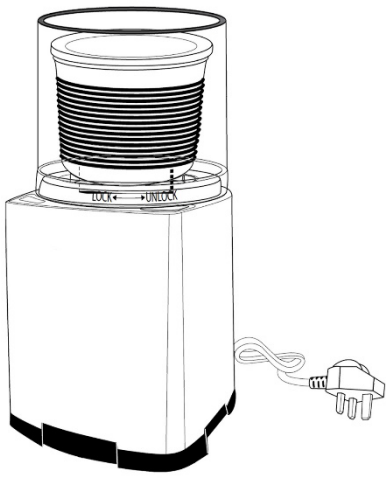
Contemporary Spice Grinder	Traditional Mortar and Pestle
	

Figure 1 Contemporary spice grinder and traditional mortar and pestle.

Traditionally, the mortar and pestle were used in both food and medical applications for grinding grain, spices, or medicinal herbs. Modern electrical equivalents are now widely available that grind spices efficiently at the touch of a button, thus removing the need for grinding spices manually. Essentially, both tools serve the same purpose and achieve the same outcome, but their construction is radically different (Fig. 2). The mortar and pestle comprises two components, which are usually constructed from natural materials such as wood or stone. In contrast, the contemporary electric spice grinder comprises approximately thirty large and small components constructed from a variety of plastics and metals.

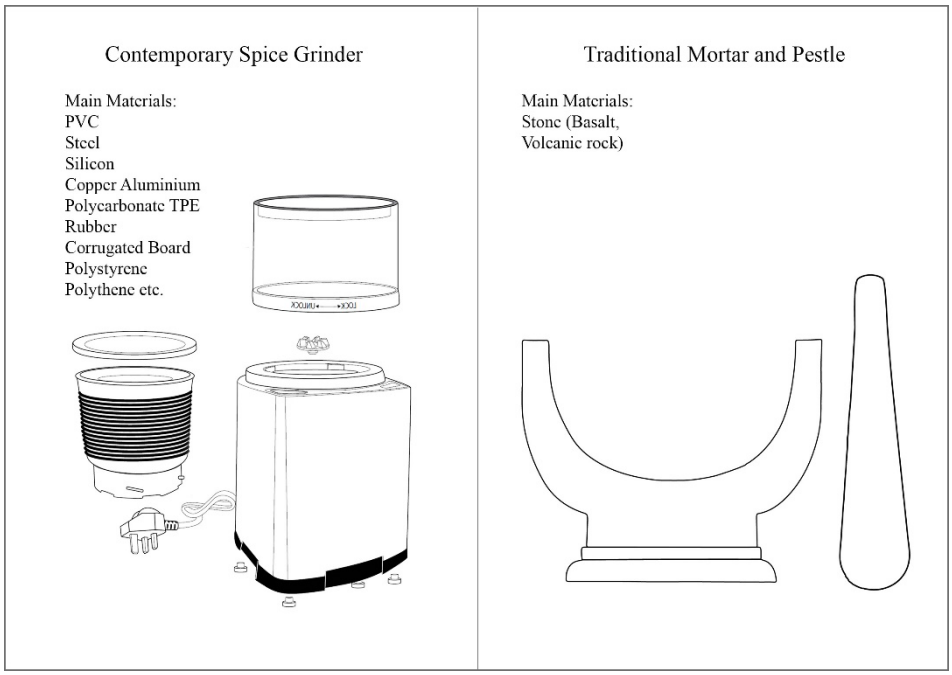


Figure 2 Materials and components of contemporary spice grinder and traditional mortar and pestle.

The extraction, manufacturing and distribution processes of these two objects are also radically different (Figure 3). The extraction and manufacturing processes associated with contemporary spice grinders are complex, dispersed and resource intensive as large quantities of raw materials, water and energy are

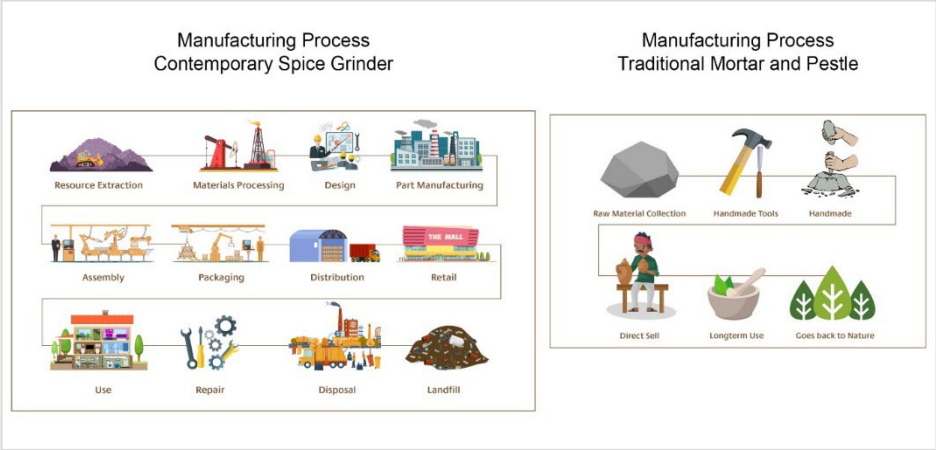


Figure 3 Manufacturing process of contemporary spice grinder and traditional mortar and pestle.

consumed during all life cycle phases of the product, which generates hazardous waste and pollution [24,25]. Furthermore, the difficulties associated with recycling complex electrical products often results in landfill disposal [24]. By contrast, the traditional mortar and pestle emerges from a far simpler, less resource intensive process. Tables 2 and 3 summarize our analysis of the contemporary spice grinder and the traditional mortar and pestle using the lens of Walker's QBL [11].

Table 2 Traditional mortar and pestle through the lens of the Quadruple Bottom Line in Design for Sustainability.

Practical Meaning: utilitarian needs and environmental consideration	Practical application	The traditional mortar and pestle has utilitarian benefits of grinding spices and medicines, making pastes and purees.
	Materials	Constructed from natural and local materials such as stone, marble, wood and metal. The product consists of only two components that are made from the same material.
	Manufacturing	The manufacturing process uses simple handmade tools. It does not require an established manufacturing unit. Makers usually carve the products outside their house or in spare areas of the house. Both components are made at the same place, so the product does not require assembly.

	Energy usage	It is a manual product, so it does not require any energy to function. Additionally, during manufacturing minimal energy is utilized.
	Longevity	It lasts for generations.
	Maintenance and repair	Requires cleaning after each use. As it is handmade and of simple construction, it can be easily repaired.
	Disposal	Made from natural materials, it goes back to nature. As it is mostly constructed from natural stone or wood, wood will decompose while natural stone lasts for lifetimes.
Personal Meaning: inner values, conscience, spirituality	Self-expression	Through the process of hand-making, makers gain a sense of self-expression and a unique identity. The buyer gains value and pride in traditional practices and develop bonds with both the product and food, as it requires manual effort.
	Historical significance	The invention of the mortar and pestle made consuming many foods possible and its origin dates back to the Stone Age
	Ceremonial use	Traditionally, turmeric/dye are ground for use in a mortar and pestle for special Hindu ceremonies like weddings.
	Spiritual values & beliefs	In Hindu mythology mortar and pestle symbolizes creation, fertility, abundance and the creation of beautiful things. Moreover, it was used by lot of gods and Rushi-Munis (holy men) to crush sacred medicines. Additionally, it has been used around lots of Shiva Temples to make Bhang (an intoxicant sacred drink made from the leaves of the female cannabis plant). Additionally, instead of using an automatic grinder, people in rural India believe that herbs and spices aromatics better when crushed in a hand powered mortar and pestle.
	Health benefits	As it is manual hand-operated product, it involves muscle exercise and eye and hand coordination.
Social Meaning: community, compassion, equity and justice	Local culture	Materials and shapes differ from region to region, e.g., as Rajasthan is the largest producer of marble, the mortar and pestle tend to be made from marble.
	Community	It helps develop a sense of community and belonging, as local networks are utilized for knowledge and skills exchange (selling and buying locally made products).
Economic Means:	Livelihood & job creation	Makers earn money by selling the product locally, thus contributing to the local economy. It also helps

financial viability and ethical income generation		to create job opportunities in various stages of production.
	Ensuring the other three elements of the QBL are fulfilled	It helps create sense of sufficiency and meaningful, long-term consumption over profit expanding and unsustainable consumption.

4 Discussion

Comparing the traditional mortar and pestle with a contemporary electric spice grinder using the Quadruple Bottom Line in Design for Sustainability as a theoretical lens enabled us to establish the key differences between the two in terms of their relationships to practical, social, personal and economic concerns. Importantly, QBL enables consideration for 'personal meaning' – a key concept that tends to be absent from eco-modern approaches to developing more sustainable ways of living. Accordingly, we offer five initial findings in this section that intend to support the development of contemporary products in a more meaningful and comprehensive way.

4.1 Designing Handcrafted Products

Handcrafting emphasizes human limits, as humans cannot produce artefacts in the same way a machine does. The human process is much slower, which is advantageous, as nothing is created unnecessarily or in abundance. Human

Table 3 Contemporary spice grinder through the lens of the Quadruple Bottom Line in Design for Sustainability

Practical Meaning: utilitarian needs and environmental consideration	Practical application	Contemporary spice grinder has utilitarian benefits of grinding spices and medicines, making pastes and purees.
	Materials	Constructed from numerous components and synthetic toxic and nontoxic materials, e.g., PVC, steel, silicon, rubber, polythene etc. [26].
	Manufacturing	Manufacturing process is complex and resource intensive, as each component requires a special manufacturing setup, facilities and machinery. Additional resources and materials for packaging, transporting and marketing, etc. are also required [27].
	Energy usage	Large amounts of raw materials, water and energy during all life cycle phases of the product are used and additional electricity is required each time it is used [28].

	Longevity	Short lifespan due to the potential for many different parts to malfunction and for plastics to shatter [28].
	Maintenance and repair	Requires assembling of parts to function and creates risk while cleaning due to sharp blades. Options to repair are minimal.
	Disposal	Some materials used can be recycled while others end up in landfills.
Personal Meaning: inner values, conscience, spirituality	Self-expression	Owning a popular branded model can bring perceived social prestige.
	Historical significance	No historical significance.
	Ceremonial use	No ceremonial use.
	Spiritual values & beliefs	No spiritual values and beliefs.
	Health benefits	No health advantages due to no physical exertion being required to operate it.
Social Meaning: community, compassion, equity and justice	Local culture	It has no relationship to local culture as various components are often manufactured in different parts of the world and then assembled together.
	Community	Does not contribute to community.
Economic Means: financial viability and ethical income generation	Livelihood & Job creation	Helps to employ people at various stages of manufacture.
	Ensuring the other three elements of the QBL are fulfilled	Contributes to our highly unsustainable consumption culture and short-term monetary economic gains.

limitation is often perceived as a weakness when compared with machines, but in terms of sustainability it is highly beneficial to the natural environment. Furthermore, Sennett [29] argues that objects that take more time to make hold more value for people. For example, a tailor-made outfit can foster a deeper personal attachment than a fast-fashion alternative. When we genuinely value objects, services or situations, we are less careless with them [30].

4.2 Create Meaningful Opportunities for Repair

In today's 'throwaway' culture, products are not built to last. The consumer is locked into a cycle of buying new items because they often throw away a damaged or broken product instead of repairing it. Hence, designers could consider how to make products easier to repair than is currently the case. Designers could also consider including simple tools should they be necessary to

make certain repairs. Moreover, the process of repairing is not just practically useful, it can also be personally meaningful, as the process affords opportunities to care for the object being repaired, calls upon our imagination and develops useful skills [29].

4.3 Design with Local, Renewable and Natural Materials

Materials play a key role in the configuration of our environment and our life. Natural materials have been in existence for a long duration, which has allowed them to adapt to environmental changes and thus reach a degree of technical sophistication that leaves humans struggling to emulate them [31]. If designers increasingly work with natural materials that are renewable and sourced locally, not only will this be beneficial to the environment, but we will also a see a more distinctive material culture emerge that reflects local environments and places.

4.4 Design for Hand-Power

Hand-powered products, unlike automatic convenience products, enable people to expend effort while a product is in use. While this may seem undesirable in an age where products increasingly require no effort, expending some effort to achieve something can be a meaningful process that helps to build product attachment [32]. Furthermore, there is no need to use any domestic energy for the product to function.

4.5 Significantly Reduce Components and Materials

Reduction is already a central concept in eco-modern approaches but what the mortar and pestle example illuminates is a significant reduction in components and materials. Reducing components and materials significantly has obvious benefits to the environment as fewer resources will be exploited, product assembly will be reduced and less energy will be utilized throughout the life cycle. Furthermore, a product that is constructed from very few components is likely to be much easier to repair.

5 Conclusion

Designers have a critical role to play in developing a sustainable material culture, but radical changes are required that reach further than eco-modern approaches. Our initial findings suggest that contemporary product design can address sustainability more substantively by learning from traditional products and practices, especially in terms of emphasizing Walker's [11] notion of 'personal meaning'.

Traditional products and practices, far from being outdated and old-fashioned, appear to have the potential to inform radical change, in particular for their capacity to fulfil more authentic human needs than is possible through our current unsustainable material culture.

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References

[1] Walker S, Giard J, editors. The Handbook of Design for Sustainability. London and New York: Bloomsbury; 2013.
[2] Ehrenfeld J, Hoffman A. Flourishing: A Frank Conversation About Sustainability. California: Stamford University Press; 2013. 19–24 p.
[3] Bhamra T, Lofthouse V. Design for Sustainability: A practical approach. Aldershot: Gower Publishing Limited; 2007.
[4] Chapman J, Gant N, editors. Designers, Visionaries and Other Stories: A Collection of Sustainable Design Essays. London: Earthscan; 2007.
[5] Thorpe A. The Designer’s Atlas of Sustainability. Washington: Island Press; 2007.
[6] Walker S. Sustainable by Design Explorations in Theory and Practice. Drapers. 2006. 16–17 p.
[7] Wever R, Vogtländer J. Design for the Value of Sustainability. In: Jeroen van der Hoeven, Pieter E Vermaas, Ibo van der Poel, editors. Handbook of Ethics, Values, and Technological Design. Springer Netherlands; 2014. p. 1–31.
[8] Ehrenfeld J. Sustainability by Design: A Subversive Strategy for Transforming Our Consumer Culture. New Haven and London: Yale University Press; 2008. 24–28 p.
[9] Walker S. Design and Spirituality: creating material culture for a wisdom economy. Des Issues. 2013;29(3):89–107.
[10] Elkington J. Cannibals with Forks The Triple Bottom Line of 21st Century Business. United Kingdom: New Society Publishers; 1997.
[11] Walker S. The Spirit of Design: objects, environment and meaning. London: Earthscan-Routledge; 2011.
[12] Walker S. Designing Sustainability. Designing Sustainability. 2014.

[13] Mullagh L, Walker S, Evans M. Living Design. The future of sustainable maker enterprises. Des J. 2019;22(sup1):849–62.
[14] Pierotti R, Wildcat D. Traditional ecological knowledge: The third alternative (commentary). Ecol Appl. 2000;10(5):1333–40.
[15] Dudgeon RC, Berkes F. Local Understandings of the Land: Traditional Ecological Knowledge and Indigenous Knowledge. 2003;75–96.
[16] Aikenhead GS, Michell H. Bridging cultures: Scientific and indigenous ways of knowing nature [Internet]. Pearson Canada; 2011.
[17] Douglas Nakashima, Marie Rou´. (4) (PDF) Indigenous Knowledge, Peoples and Sustainable Practice, by Nakashima and Roué | Marie Roué - Academia.edu. Encycl Glob Environ Chang [Internet]. 2002 [cited 2020 Sep 30]; Available from: https://www.academia.edu/8047869/Indigenous_Knowledge_Peoples_and_Sustainable_Practice_by_Nakashima_and_Roué
[18] Walker S. Design and Spirituality : A Philosophy of Material Cultures [Internet]. Abingdon, Oxon; New York: Routledge; 2021 [cited 2021 Jul 13]. Available from: https://ebookcentral.proquest.com/lib/lancaster/reader.action?docID=6413931&ppg=1
[19] Berkes F, Colding J, Folke C. Rediscovery of Traditional Ecological Knowledge as adaptive management. Ecol Appl. 2000;10(5):1251–62.
[20] Shils E. Tradition. Vol. 33, Minerva. 1981. 1–3 p.
[21] Walker S, Evans M, Mullagh L. Meaningful practices: The contemporary relevance of traditional making for sustainable material futures. Cr Res. 2019;10(2):183–210.
[22] Yin RK. Case study research: Design and methods. 3rd ed. London: SAGE Publication; 2009.
[23] Yin RK. Applications of case study research. 2nd ed. London: SAGE Publications; 2003.
[24] Brown T. The environmental impact of electronics manufacturing - The Manufacturer [Internet]. The Manufacturer. 2021 [cited 2021 Jul 20]. Available from: https://www.themanufacturer.com/articles/the-environmental-impact-of-electronics-manufacturing/
[25] Chiarenzelli R V, Joba EL. Journal of the Air Pollution Control Association The Effects of Air Pollution on Electrical Contact Materials: A Field Study. J Air Pollut Control Assoc [Internet]. 1966 [cited 2021 Jul 20];16(3):123–7. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=uawm20

[26] Industrial Mixers. Mixer Manufacturers | Mixer Suppliers [Internet]. https://www.industrialmixers.com/. [cited 2022 Feb 8]. Available from: https://www.industrialmixers.com/
[27] Salim E, George AM, Naiju CD, Dr. Annamalai K. Conceptualization Design for Manufacture and Assembly (DFMA) of Juicer Mixer Grinder. In: National Conference on Advances in Mechanical Engineering "NCAME" [Internet]. Vellore: SBCEC; 2011 [cited 2022 Feb 8]. Available from: https://www.researchgate.net/publication/291074694_Conceptualization_Design_for_Manufacture_and_Assembly_DFMA_of_Juicer_Mixer_Grinder
[28] Tennant M. Future of Manufacturing Project: Evidence Paper 35 Sustainability and manufacturing Sustainability and manufacturing. London; 2013 Oct.
[29] Sennett R. The craftsman. New Haven: Yale University Press; 2008.
[30] Chapman J. Emotionally durable design: Objects, experiences and empathy. Emotionally Durable Design: Objects, Experiences and Empathy. UK and USA: Earthscan; 2005. 1–211 p.
[31] Ormondroyd GA, Morris AF, editors. Designing with Natural Materials. Boca Raton, London, New York: Taylor & Francis Group; 2019.
[32] Borgmann A. Technology and the character of contemporary life: A philosophical inquiry. Chicago: University of Chicago Press; 1987.