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TIME IN THE SUSTAINABLE CONSUMPTION CONTEXT

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ABSTRACT

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This is an attempt to figure out how Time is defined and used in the sustainable consumption context. Although Time is known and defined as an abstract concept in many branches of science, in practice and in real life it performs beyond its limited definitions. In the sustainable consumption documents, time generally is defined as a limited resource such as money and energy, to be allocated to activities and to be understood by the practices it is allocated to. Time concept is assessed over selected materials categorizing it to seven defined categories including Time use, Use of time, Time related rebound effect, Time related value-action gap, Time pressure, Time related well-being and Social engagement Time. Although the distinguished categories are discussed in detail within articles, some essential assumptions such as interchangeability or not interchangeability of money and time is considered marginal while these assumptions potentially can cause various results in practice. Clarifying practical knowledge of people about Time concept and applying that in sustainable consumption strategies may lead to more effective results and policies. Qualitative content analysis is used as the method for assessing the definition and use of Time in the selected published articles.

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In Lappeenranta 20th January 2020

Fatemeh Jouzi

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Appendix 1. Vitruvian man

LIST OF SYMBOLS

m mass [tonne]

Subscripts

e equivalent

min minute

Abbreviations

GDP Gross Domestic Product

GHG Green House Gas

IGES Institute of Global Environmental Strategies

LUT Lappeenranta University of Technology

SDG Sustainable Development Goal

WCED World Commission on Environment and Development

1 INTRODUCTION

The so basic definition I learned in the very beginning of my master's degree studies in Sustainability Science and Solutions at Lappeenranta-Lahti University of Technology (LUT), was the definition of sustainable development:

“Sustainable development is development that meets the needs of present without compromising the ability of future generations to meet their own needs.” (Brundtland 1987, 41)

Aside from all notions authors of the World Commission on Environment and Development (WCED) were concerned about modifying this definition, there are two major concepts (else than sustainability) - time and consumption - embedded in this key definition which are relevant to this study's main question.

Ability of meeting the needs should not be compromising globally and along time if societies developed in a sustainable way. People spend money and consume resources to gain their wants and to cover their needs. They are also concerned about the time. But how the concept of time is defined in individual's daily life? Does time have some hidden aspects else than being a resource to be spent in various activities?

Time is a concept we use in our daily, monthly and yearly personal and social life routines, without any doubt about its reality. Owning a watch (or in other level a calendar) is enough to be confident of owning a clear understanding of time.

Literal interpretation of the useful conceptual scientific entities such as energy, information, money and time, are very important in social studies (Labanca (ed.) 2017, 171). Labanca (2017, 200-203) has discussed in detail the importance of literal interpretation and realization of energy as a conceptual entity and its consequences in people's life and policy making. He underlines people welfare could be increased when they be more concerned about their practical knowledge of such essential concepts (Labanca (ed.) 2017, 200-203).

Investigating how time is defined and used in sustainable consumption context is the major aim of this paper. In order to achieve this goal various dimensions of time were investigated over sustainable consumption related published articles in the past 20 years, using qualitative content analysis. The results of this study in practice affect approaches towards sustainable consumption and can be an opening to achieve the predetermined goals as well as to define more realistic goals and policies in the future. Before entering the structured content of the thesis, the context in which the main debates of this study are rooted, is clarified.

1.1 Background

Contemporary debates on the topic of this study are provided in two sections. Current discussions about the connection of sustainability and consumption are provided followed by the debates on the connection of time and consumption.

1.1.1 Sustainability and consumption

Contemporary consumption pattern in high income societies of developed world, is not assessed sustainable (Gough 2017, 11). Sustainable consumption is attracting increasing interest since the revised economic growth is not adequate to satisfy the necessity of climate stability. Before providing some lines about contemporary "sustainable consumption" debates, two important topics in sustainability discussions should be mentioned. First one is the "Planetary Boundaries" which was introduced in 2009 as a "safe operating space for humanity". Nine interconnected anthropological consequences of human civilization are known as definers of environmental thresholds for human activities. Climate change, rate of biodiversity loss, nitrogen and phosphorus cycles, stratospheric ozone depletion, global freshwater use, change in land use, atmospheric aerosol loading, and chemical pollution are the introduced categories. Thresholds of the first and second ones are already crossed as well as Nitrogen loading. (Rockström, 2009.) Although almost one third of these boundaries are already crossed, Earth complex system has not met the tipping point yet (Steffen et al. 2015).

The second topic with a key role in sustainability discussions is "Sustainable Development Goals" (SDGs). In 2015, the SDGs were accepted as the social foundation of well-being by the United Nation (Gough 2017, 20). In short, enough food and clean water, availability of education and healthcare, gender equality, income and housing, social equality and political

voice as well as peace are the goals to be achieved (Raworth 2017, 45). The SDGs are relevant to human well-being and are based on the universal human rights. In addition, they are related to human needs and wants, which are the basic terms in consumption definition.

Based on the two mentioned sustainability related frames, Raworth (2017, 44) introduces her famous doughnut as a green belt for human activities. This tire shape diagram in Figure 1, shows the safe zone for human activities including consumption of resources (Raworth 2017, 44).

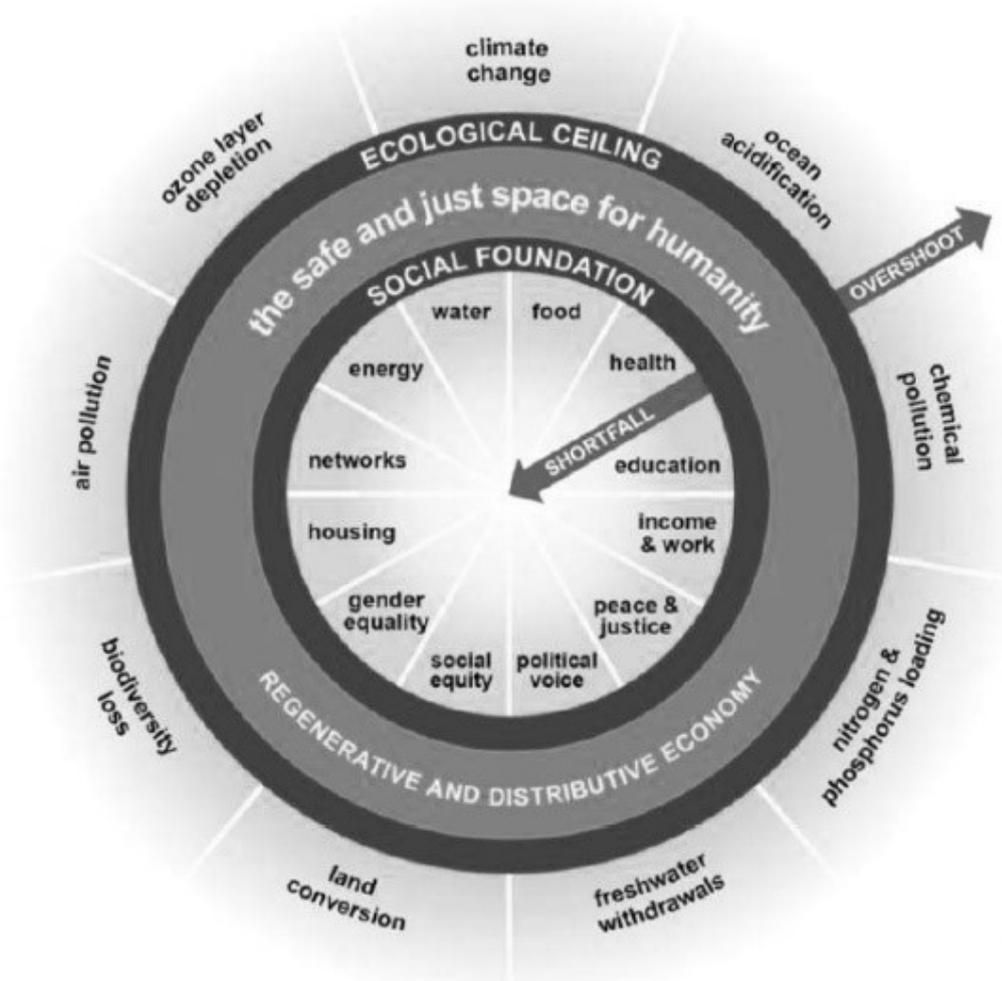


Figure 1. Environmental and social limits shape a green zone for human activities (Raworth 2017, 44).

Human well-being is influenced by climate change which is urgently challenged by time limitation. The limited time for human to mitigate their activity in this ring is not obvious but indirectly it is hidden in the factors she has addressed as the necessary factors for living

in the safe zone, including population, distribution, aspiration, technology and governance (Raworth 2017, 57). Aspiration is related to consumption, our unnecessary willing for buying goods. She cites Jackson's: "We are persuaded to spend money we don't have on things we don't need to make impressions that won't last on people we don't care about" (Raworth 2017, 58).

In her analysis, Raworth (2017, 26, 27) restructures basic economic debates and suggests seven new economic perspectives for solving 21st century challenges. She draws our attentions to the necessity of re-sketching the GDP diagram being realistic about the limitation of growth and defining new goals (Raworth 2017, 31). She suggests a shift from "forward and up" towards "balance" growth (Raworth 2017, 53).

Seeing economy as a subsystem of Earth system embedded in it, is her other suggestion to be rethought. Instead of the classic monetary circular flow she looks at economy as an open system with flows of material and energy within the Earth closed system (Raworth 2017, 70). In this new perspective government, society, commons and households have important roles in economy system beyond markets. Beyond income, our well-being depends on natural, social, human and physical health resources as well (Raworth 2017, 93). She suggests that beyond scientific abstraction of "rational economic man", people should be social adaptable humans who practically behave alternatively compared to traditionally introduced "rational economic" man (Raworth 2017, 96).

Starting with Raworth doughnut, Gough (2017, 94) reveals the dependency of the inner ring and the outer one which causes some dilemmas for living in the safe zone. Regarding all SDGs (not just health and survival needs), there are contradictions between policies care about planetary boundaries and policies care about achieving sustainable development goals. It is a confirmed scientific fact that developed countries are more concerned about welfare compared to environmental issues due to the direct immediate impacts of the first one and indirect impacts of the second one (Gough 2017, 113.). He argues that there is no linear dependency between needs and CO₂e emissions. So, beyond increasing eco-efficiency of production processes, consumption patterns should be surveyed and should be changed in the developed countries (Gough 2017, 99).

Gough draws our attentions to the fact that any kind of growth - orthodox GDP or new defined "green growth" - is in contradiction with climate stability (Gough 2017, 68). Nevertheless, in practice, it is tough to stop growth or even cut the emissions according to necessity limits for staying within 2 degree by 2050 (Gough 2017, 70). A serious shift in demand which implies structural changes in global economy and policy, is required (Gough 2017, 71) and it is the reason that makes "sustainable consumption" a challenging issue to be discussed. Separating territorial emission and consumption emissions clarifies the fact that, although GDP assessments shows progress in the East, tracing consumption rate reveals the continuous inequality concerning people well-being (Gough 2017, 73). The contemporary desirable GDP poorly acts regarding decreasing poverty - one of the prioritized SDGs - since the poorest 60 percent of the world population receive only 5 percent of the extra income of economic growth (Gough 2017, 78). Satisfying preliminary needs (mostly health and survival ones) is possible via low emitting processes, while meeting further needs or consumer preference are associated with high emissions (Gough 2017, 89). According to Gough, the main quantitative means of sustainability is in hand via tracing consumption GHG emissions per person (Gough 2017, 88). He concludes equity and prioritizing human needs should play a key role in climate solutions (Gough 2017, 103).

Gough (2017, 127) introduces three type of solution based on alternative economic theories, increasing the price of carbon, consumer participation in efficient use via public standards and citizen engagement and transforming the economy (transformative investment is required). He argues all three solutions should be attended simultaneously for overcoming the time limitation (Gough 2017, 127). He evaluates practical results of these mitigation solutions as well. The second strategy - consumer participation in efficient use - is about sustainable consumption and includes two kind of policies. Firstly, changing the composition of consumption such as replacing beef meals with other lower emission foods. The second policy is sufficiency which means an overall reduction of consumption. According to Gough (2017, 146) without these policies required GHG emission reduction to fulfil 2-degree target would not be achievable. (Gough 2017, 146.) He reveals that cutting emissions of the luxury consumptions is not considerable compared to reducing emissions of the usual consumptions. So, he comes up to a vital question and necessity of answering it. What are

human primary needs? (Gough 2017, 149.) Gough (2017, 158) provides five alternative theories of consumption and reveals that all five theories are faced barriers towards sustainable consumption. He uses Jackson's "iron cage" term, to explain consumption as a system lock-in and unintended results of consumption practices (Gough 2017, 160). Creation of new social norms as well as alternative evaluation of social practices are suggested for moving towards sustainable consumption (Gough 2017, 169).

In their need theory, Doyal and Gough (1991), have mitigated human needs to health and autonomy. Gough (2017, 42) claims the basic needs of people are summarized in these two needs, no matter where and when they live. Basic needs are ones if not satisfied will cause "serious harm". These are necessary for being socially effective. Health as a necessary need includes physical and mental preconditions for taking part in social activities, and autonomy is defined as the ability of making choices. (Gough 2017, 42.) He finally concludes the defined basic universal needs lead us to an ethical obligation for priority of need satisfaction over consumer preferences or "wants" (Gough 2017, 47). Based on the provided definitions for "universal needs" and "serious harms" caused when they are not covered, there will be moral obligations in global level, which make a universal moral political economy necessary, to ensure the mentioned priority of needs over wants. He categorizes this respect under social justice and human rights. (Gough 2017, 58.) The obligations are on individuals as well as institutions across timeline and globally (Gough 2017, 62).

All in all, people consume resources to satisfy their needs. This simple definition is challenging if the 'availability of the resources' and 'human needs to be satisfied', be questioned. Sustainable consumption is defined in literature based on the answers to availability of resources and necessity of needs. Despite these arguments, a new question rises, whether people consume resources only to satisfy their needs?

1.1.2 Time and consumption

People spend their time as well as their money and other available resources. this is the most common approach in literatures to illuminate relationship of time and consumption. Consumption is an activity which happens along timeline. With an economic approach, Jalas (2006, 151) in his study of temporalities of consumption, discusses consumption as a time-

consuming activity and suggests survey of individuals' consumption behaviour and its dependency on individuals' time use patterns (Jalas 2006, 151). In his analysis, Jalas (2006, 131) concludes individuals consume not only for satisfying needs but also for other reasons. These extra reasons for consumption cannot simply be categorized under unnecessary needs. Jalas (2006, 5) claims identity of individuals is relevant to their consumption patterns as well as their autonomy. "Filling one's time" is another reason for consumption in the modern societies. People are taught to fill their time by consumption and feeling fear of empty time, people intensify consumption practices. (Jalas 2006, 43.) He also suggests some "anti-science" approaches such as artistic and creative interpretation for grasping consumption and its reasons (Jalas 2006, 22) which are out of this study's scope.

Contemporary parallel movements concerning environmental issues and speed of life, are regarded as reasons for correlation of "environment" (and consequently, sustainable consumption) and "time" (Jalas 2006, 4).

Lifestyle carbon footprint and its contribution to global warming and climate change is one of the meeting points of time and consumption. Time is realized by activities. Institute for Global Environmental Strategies (IGES) in its 2019 published report, has emphasized on individuals' potential for sustaining personal and global consumption. Authors of IGES report surveyed possibility of emission reduction within the classified categories including nutrition, housing and mobility energy, consumer goods as well as leisure and services. Estimating carbon footprint in some selected nations, they suggest affordable cut in each category. They are also concerned about the scarce of time and the urgent need for making change in individual's consumption behaviours across the world. (IGES 2019)

While the main proposed solutions for global warming and climate change are concentrated on technologies, inclusive changes in individual behaviours would significantly affects Green House Gas (GHG) emissions. For instance, in Finland the every person's carbon footprint is 10.4 tonne CO_{2e} per year, 1.8 tonne is allocated to food and drink, 2.5 tonne to housing and supply of utilities, 2.8 tonne to mobility, 1.3 tonne to purchased goods for personal use and 2.1 tonne to leisure activities and services (IGES 2019, 14). Paris agreement

goal for limiting the global warming to 1.5°C is not achievable unless individual carbon footprint is limited to 0.7 tonne CO₂e per year (IGES 2019).

Shove et al. (ed.) (2009) have gathered academic empirical researches in sociological context, to facilitate understanding patterns of time-consuming activities in everyday life as well as connection of material culture and time consumption (Shove et al. (ed.) 2009, 6). Although some of their debates and conclusions are out of the scope of this study, for keeping the cohesion of contemporary debates the summary of their relevant debates is provided in following lines.

The term "too much, too fast" lifestyle, which is denounced by environmental campaigns, implies the connection of consumption and time. Everyday practices (such as consumption) are producers or consumers of time. (Shove et al. (ed.) 2009, 17.) Considering time as a limited resource that should be allocated to practices makes them, time consumers. On the other hand, considering time as a complex combination of rhythms of life, makes the practices, time producers. Therefore, people consume to make time. If some other social rhythms are replaced by current consumption patterns, then individuals make time via participating in other activities else than consumption.

For analysis of activities, the objective time concept should be expanded to interwoven concept of time-space and the spatial features of everyday activities should be analysed simultaneously with their temporal features (Shove et al. (ed.) 2009, 36). Time-space is the base for existence of the social activities (Shove et al. (ed.) 2009, 46).

Regarding time pressure, although recent generations' "duration of free time" is longer comparing to previous generations, today, people are more concerned about "lack of time" and time pressure (Shove et al. (ed.) 2009, 49). Five different explanation - economic restructuring and dual earner, hours of paid, consumer culture, being busy and temporal order of social life are the reasons of time shortage (Shove et al. (ed.) 2009, 49-51). For instance, different cultural norms, make people more concerned about lack of time for their personal relationship practices compared to previous generations (Shove et al. (ed.) 2009,

59). Similar reasoning is valid for spatial separation (instead of temporal separation) for example, comparing feeling time pressure in a busy city and a small village.

In order to analyse "too much, too fast" as an explanation which implies over consumption as well as time pressure in modern world, lifestyle routines should be investigated. Routines in our everyday life happen without conscious and our mind in duration of habitual activities usually concerns about something else than that activity (Shove et al (ed.) 2009, 99). Routines can be considered as prisons that limit individual actions and prohibit new experiences. On the other hand, routines can be considered as a liberating force, making individual's mind free to be concerned about other issues. (Shove et al (ed.) 2009, 100.) For making routines (for example new consumption behaviour) or stop routines, rhythms of everyday life should be surveyed. everyday practices are ordered on timeline while routines make spaces to gain other goals (Shove et al (ed.) 2009, 110.) Regarding consumption practices as routines, consumption time would be a chance for daydreaming, managing our connections, problem solving or other achieving purposes. Practicing routines (such as consumption) sometimes give us opportunity to get ourselves out of some usual unpleasant situation. (Shove et al (ed.) 2009, 144.) For example, we are overloaded with many job tasks and shopping is a liberation for getting rid of the tasks.

In addition, objects potentially can give meanings to the minutes. They can convert our routines and ordinary time to extraordinary moments (Shove et al (ed.) 2009, 190). Unscheduled ice-cream during a scientific day or an unexpected background music at dinner time, are simple examples of the materials taking part in changing the quality of time. Quality of time is a concept that rises questions and answers. Do people consume to make special time?

Objects have temporalities. This temporal feature is a consequence of the relationship between individual and objective or material world (Shove et al (ed.) 2009, 203). Person's realization of time reflects objective world (Shove et al (ed.) 2009, 213).

1.2 Goal and scope

Time is a concept with some scientific definitions as well as some practical meanings in individuals' everyday life. **This study aims to investigate time definition and use in sustainable consumption debates.** Sustainable consumption is necessary for achieving environmental goals and time as an effective component can be interpreted and investigated as a tool towards this goal.

Realization and interpretation of time directly affect analysis of the issues which are relevant to it. This thesis is about time definition and interpretation in relationship with consumption in a sustainable way. The main components and their relationships regarding the research question are presented in Figure 2.

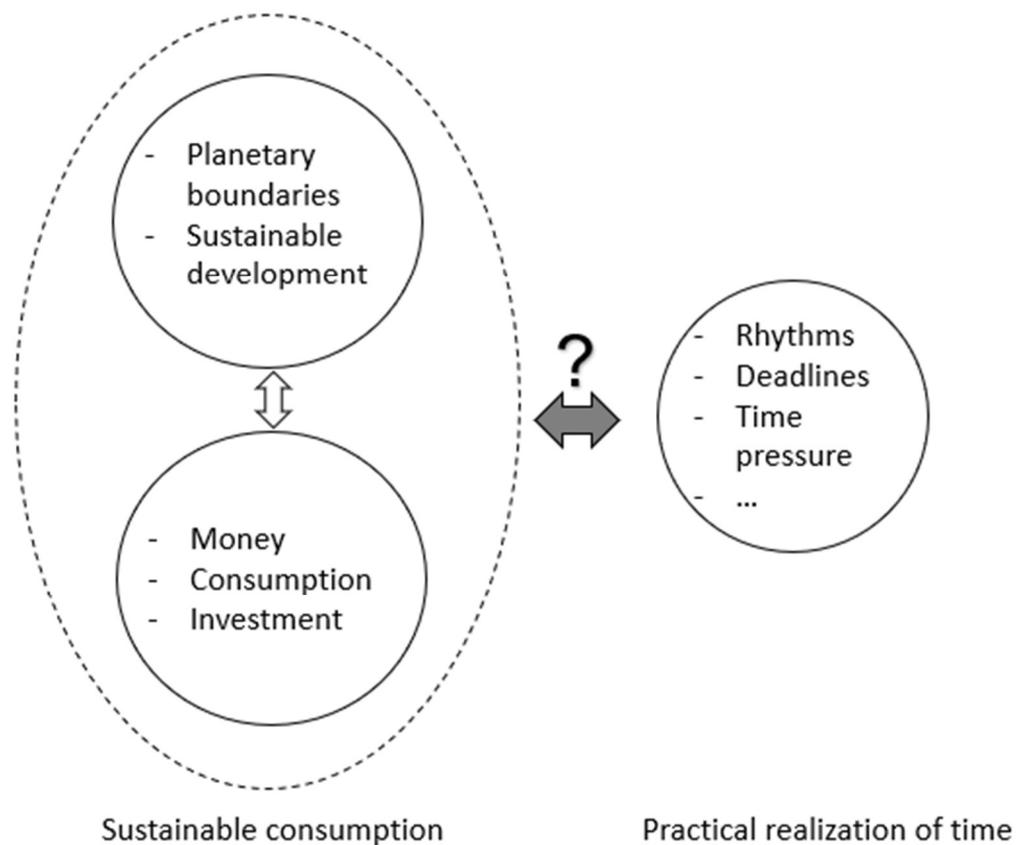


Figure 2. Research question

This study is not going to answer "why" actors do not react properly for dealing climate change as a great threat for the world. Time is not redefined in this study as well. Redefinition of the time concept potentially can lead to the change in human cognition of the world and philosophy of life. Does the concept of time practically affect individual behaviour? How it affects people reactions to threats? These questions are left out of the scope of this study to be answered in future works.

1.3 Structure of the thesis

Progressing towards the goal of this study is processed in three steps. Firstly, contemporary debates on relationship of sustainability and consumption as well as time and consumption are surveyed following by the main research's components placed in a framework within the science structure regarding the research question and scope of the study. In the second step, after introduction of the research methodology, time concept and its relevant terms are investigated through selected published articles. Qualitative content analysis is the selected method in this investigation. In the third step, regard the analysis and cross category debates some results are produced and complementary debates are provided in discussion section as well as some suggestions for future works.

2 THEORY AND FRAMEWORK

Back to the research question, the three main components - sustainability, consumption and time - are explained and detailed in one or more branches of science. Any attempt for making changes in behaviours and practices which are grown in an established historical, cultural and social context, necessarily needs "cross-disciplinary" studies (Gough 2017, 11). Considering aim of this study to analysis interpretation of time and its use, an interdisciplinary study is needed to cover various aspects of the research. The main scientific disciplines which cover sustainability, consumption and time and their definition for the most applicable term in this thesis are explained in the next lines.

2.1 Basic definitions

Sustainability science is emerged as an ongoing academic discipline to manage social and environmental problematic consequences of modern civilization. United nation World Commission on Environment and Development in 1987, in their report about our common future which is known as Brundtland report, defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987, 41).

Well-being is another term which is used frequently in literature analysis part. Based on Oxford online dictionary of economics, it means the state of being comfortable, healthy or happy. In many documents it has been considered with a same meaning as welfare. In some economic documents, welfare is decreased to income support. (Oxford Reference, 2017)

Consumption in Oxford dictionary of economics, is defined as the final use of goods and services by economic agents to satisfy their needs, as opposed to providing for future production (Oxford Reference 2017a). Based on Oxford dictionary of environment and conservation, it is defined as the process of using resources to satisfy human wants or needs (Oxford Reference 2017b). while in economic context the aim of consumption is supposed to be satisfying human needs, in environmental context two alter terms- needs and wants-

are used to explain the aim of consumption. separation between satisfying needs and wants is an important base in sustainable consumption debates.

Regard to the wide application of the term "need" in various disciplines, it is not easy to provide a unique definition for that. However, the term "necessary for survival", is common in psychology and sociology contexts (Oxford References 2015). The necessity of needs for survival is the meaning that differs it from wants in sustainability and environmental debates.

In economic and financial dictionaries of Oxford, money is basically defined as 'a medium of exchange and store of value' (Oxford Reference 2017c). The term 'value' and its relationship with money is important. Value is the final aim and money is one of the medium for exchanging value. In economic context value has been considered equal to the price be multiplied by quantity but, generally it means "The regard that something is held to deserve. the importance or usefulness of something" (Oxford Reference 2020).

Gross Domestic Product or GDP is "the total value of goods produced, and services provided in a country for one year" (Oxford Reference 2017d). Based on the definition investments, particularly long-term investments are not included in GDP. Historically the GDP is supposed to grow over time exponentially. This definition is criticized for more than half of the century as well as the idea of unlimited growth. Some of the limitation of this definition is that only the market value of goods and provided services are included in it. Moreover, there is no indication about distribution of the income in the society. According to Raworth (2017, 40) systems thinker Meadows criticized conventional GDP by asking: "growth of what, and why, and for whom, and who pays the cost, and how long can it last, and what is the coast of planet, and how much is enough?" (Raworth 2017, 40). Some other economists have suggested the boarders of "richness" should be widened from economy to human life (Raworth 2017, 43).

2.2 Time

Time and its related terms are used in almost all branches of science. In classical physics a clear definition of time is provided based on time measurement and a unique universal

timeline. The unique absolute definition of time turns vague after Einstein relativity debates on spacetime and the progressed discussions in cosmology. In addition, quantum mechanics introduced time in uncertainty equation which was different from the definite measurable time and in recent debates of chaos theory time is one dimension of the complex system.

Considering social sciences, sociologists, politicians and economists utilize time to describe evolution, changes, growth, an ordering line for events and a necessity for practices and actions to exist. In history as well as future studies, time is the unique line for ordering events on it. Past, present and future define the ancient line of time towards unlimited future.

In social context, time is discussed regard to practice theories. Time and practices can be discussed regarded to the fact that limited time should be allocated to routines and everyday activities. on the other hand, practices shape the time and its quality. In sociology time is defined practically by its repetition in calendars, ritual events and the numerous overlapped rhythms within society. Alter rhythms simultaneously forms the society, cycles in authority, business and individual's everyday life, and every single actor takes part directly in many of them composing harmonies in the society. Some sociologists expand cycles and rhythms to every single being in society. Lefebvre (2004, 31) says: "In place of a collection of fixed things, you will follow each being, each body, as having its own time above the whole. each one therefore having its place, its rhythm, with its recent past, a foreseeable and distant future" (Lefebvre 2004, 31).

Regarding economics as a science to study human behaviour concerning goals and scarce of the resources (Raworth 2017, 34), time is used and evaluated as a scarce mean to be allocated to alternative practices. According to Gough, time is one of the individuals' resources in their daily life (Gough 2017, 182). This is the basic definition which is used sustainable consumption context.

Finally, realization of time is widely discussed in cognitive science including psychological, linguistics, anthropological and epistemological debates. Cognitive debates about realization are so vast. In this study, discussions about time realization are limited partly to psychological realization and lengthy investigation is left for future studies. It should be

mentioned here that psychological and linguistic debates can also, be much more expanded by psychologists and linguists. In humanities many debates are developed concerning time category. As philosophy, art and literature are not classified under the science category, the time related debates in these branches of human knowledge and experience are left out of this study's scope.

2.3 Synthesized frame

Considering the goal of this research and the study question, in following chapters, discussions are mainly based on environmental studies and Economics. some limited sociological and psychological debates are added as well. The theoretical positioning of the thesis is shown in Figure 3.

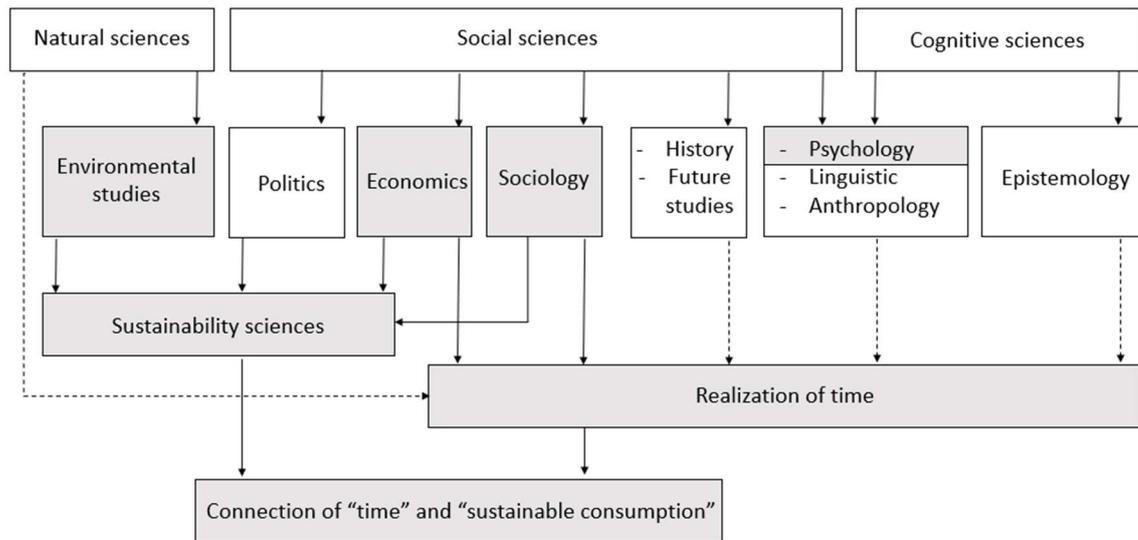


Figure 3. Theoretical positioning of the thesis

3 RESEARCH METHOD

Regarding time and other components of this study's framework - sustainability and consumption - which are crucial to find a suitable answer for the research's question, a qualitative method is an acceptable scientific mean. Qualitative studies usually lead to a deeper understanding of the subject and suit complex nature of social and humanity topics (Hoepfl 1997) and qualitative content analysis is selected as the proper qualitative method in this study.

3.1 Why qualitative content analysis

Qualitative content analysis is a scientific method following research standards, for assigning categories in the qualitative texts from alternative contexts via a defined step by step model (Mayring 2014, 10). This method historically was developed for analysing and interpreting communication and news materials and is influenced by humanities and linguistic approaches (Mayring 2014, 17).

Realization of time is directly related to human mind and his cognition of time. Regarding the various components from different branches of science included in the theory and framework of this study, qualitative content analysis is chosen since as a scientific method is conscious about context.

Qualitative content analysis in this study is a deductive content analysis. The goal of deductive content analysis is to elicit systematically the given category out of the selected documents (Mayring 2014, 93). In this study time categories and terms which are relevant to the them are extracted from the selected documents and are interpreted based on designed content-analytical procedure.

3.2 Content-analytical procedure

There are different algorithms for content analysing. Based on Mayring (2014, 96) suggested models, an algorithm is designed for the text analysing in this study.

The starting point is distinguishing the research question. How time is defined and used in sustainable consumption articles, is this study question and the starting point. Regarding dynamic nature of qualitative researches, research question may be modified during the research process. The considered research question is the modified one within process of the analysis.

Next step is clarifying the desired categories and their relevant terms. Time is the selected concept to be surveyed and time categories in everyday life are time use, use of time, time related rebound effect, time related value-action gap, time pressure, time related well-being and social engagement time, which are defined to be detected and analysed.

Defining some rules for coding and classifying extracted categories in order to gain proper base for the final interpretation is the next step of the analysis procedure. For instance, to avoid numerous adverbs and terms relevant to time limitation, all psychological terms related to stress and intensive emotions regarding time scarcity are classified in the 'time pressure' category. In material passing phase, time categories are coded and simultaneously, rules and classifications are modified via a self-modified cycle. Next phase is final analysis and interpretation of the extracted information. To evaluate use and understanding of time in sustainable consumption context we need to extract time related terms and link them to each other.

After applying this procedure and based on the results, revision is applied on study goals as well as theoretical framework. This study's model of qualitative content analysis is shown in Figure 4.

This is a dynamic procedure which improves itself while it is utilized for analysing the research materials. This dynamic procedure provides opportunity for progress of the whole qualitative study from the early defined research question to the interpretations and results. Like other qualitative methods, this is not a method for testing an already existed theory but a tool to develop a new perspective or theory (Hoepfl 1997).

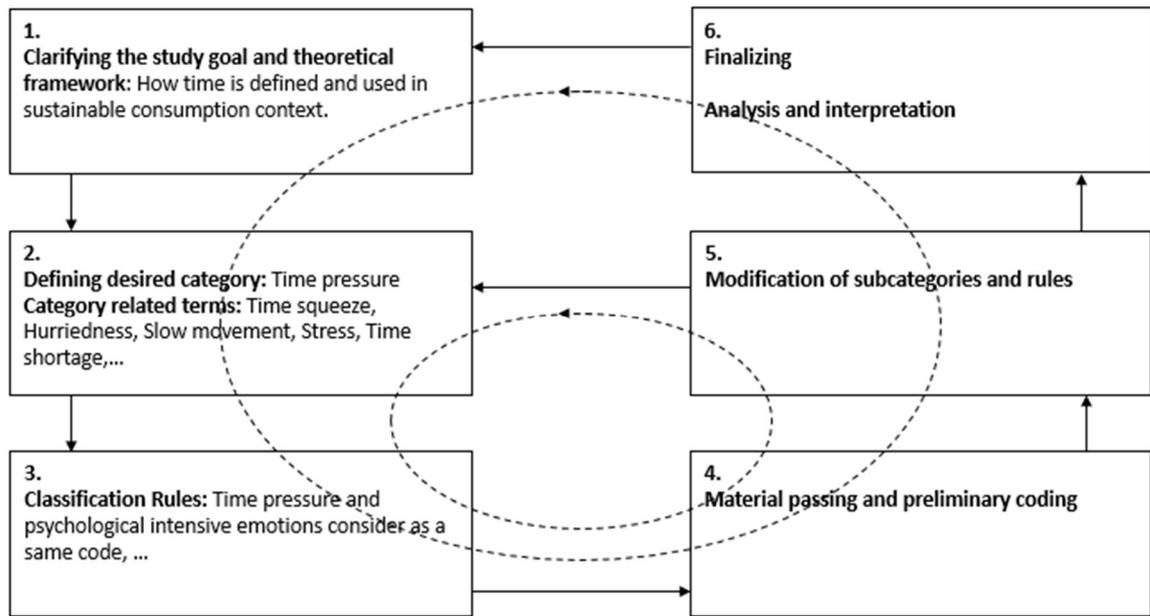


Figure 4. Qualitative content analysis dynamic model in this study

3.3 Material selection plan

In the qualitative studies, unlike quantitative ones, material selection is a targeted process (Hoepfl 1997). Regarding the defined goal of this study a selection of published articles are considered as input materials.

The process of selecting articles started by limiting the publication duration. The years for publication of articles is limited to the year 1992 and 2019. In 1992, united nations conference on environment and development in Rio de Janeiro, produced a global plan for sustainable development and the concept of sustainability introduced to the scientific society with the meaning that is used in this study. Using Scopus database documents are limited to published articles or reviews in Journals in English. Regarding the vast use of the word time, alternative combination of the key words examined and finally following combination is used:

(sustainab* (which includes sustainability OR sustainable) AND consumption) in the title OR abstract OR keywords, AND (time OR temporal* (which includes temporality as well)) in the keywords of the articles.

the results are not limited to the specific Journals but some irrelevant subjects regarding the scope and framework of this study are excluded. The excluded domains are medicine, chemistry, physics, neuroscience, dentistry, agriculture, nursing, computer, mathematics, immunology.

Applying these criteria in 20th of the August 2019, 350 articles were found. Although ‘time OR temporal*’ was included in the title or abstract or keywords of the articles, ‘time’ was not a matter of subject in many of the found articles. In the next step, abstracts of the found materials were over viewed and 36 articles which 'time' was a matter of subject in them were selected as the first section.

Finally, and after reviewing the first selection of articles, 13 articles which have some debates and argues on the role and use of the concept of time, are picked for the final analysis. The earlier published article, 'Time and Wealth' by Lucia A. Reisch (2001), regard to its essential debates and clear assumption of not-interchangeability of time and money is left out of the proposed analysis procedure and is analyzed separately. the designed content analysis procedure is applied on the other 12 articles and mentioned categories are distinguished within them.

There are some limitations in this selection plan. First limitation is about the selected database that may not cover all relevant articles or not get free access to the academic researcher for some articles. Second limitation is about the designed pattern of selection. The primary step of material selection is objective and repeatable but the next two steps of selection are subjective and based on knowledge and purpose of the researcher.

4 LITERATURE ANALYSIS

Due to the fact that the selection method has been partly subjective and the fact that some of the potentially valuable articles have not been accessible via academic database (Scopus) which is used in this article review, providing numeric or statistical analysis are avoided and debates are mostly focused on the categories and their connections.

Figure 1 is a statistical graph about the distribution of the first selection from 350 found articles based on keywords.

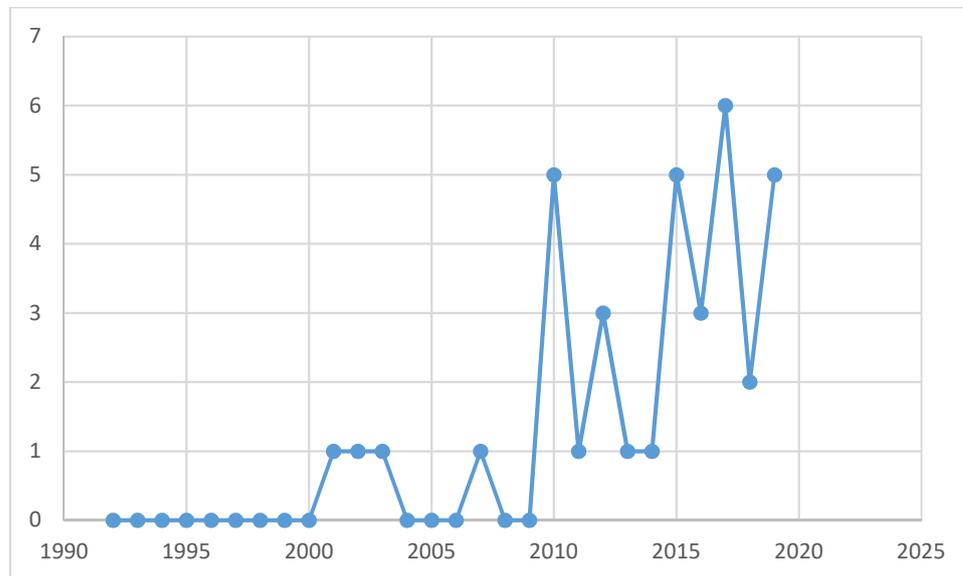


Figure 5. The distribution of first selection of article based on time as a subject matter (36/350).

Regarding the selection plan's limitations that was mentioned at the beginning of this section, a reliable interpretation is that the overall pattern of publications is almost like the general pattern of sustainability concerned published articles. In addition, Time as a matter of subject has contributed to sustainable consumption debates since early 2000, almost a decade after the concept of sustainability globalized in 1992. Regarding the importance of the first publication arguing new topics, the earliest published article - Reisch's article on time and wealth (2001), is discussed separately and is excluded the categorization and related debates. Selected articles are introduced in Table.1.

Table 1. Introduction of the selected articles.

	Year	Title	Authors
1	2019	Time Matters: The carbon footprint of everyday activities in Austria	Barbara Smetschka, Dominik Wiedenhofer, Claudine Egger, Edeltraud Haselateiner, Daniel Moran, Veronika Gaube
2	2019	personal and societal rhythms - Showering as a case	Kirsten Gram-Hanssen, Toke Haunstrup Christensen, Line Valdorff Madsen
3	2017	How do money and time restrictions influence self-constraining behavior in polluting the commons?	Katherine Arbuthnott, Andrea Scerbe
4	2017	Rebound effects in Living Labs: Opportunities for monitoring and mitigating re-spending and time use effects in user integrated innovation design	Johannes Buhl, Justus Von Geibler, Laura Echternacht, Moritz Linder
5	2016	Normality against Sustainability- Mobility practices of well-to-do households	Riikka Aro
6	2016	Work less, do less? Working time reductions and rebound effects	Johannes Buhl, Jose Acosta
7	2015	What time to adapt? The role of discretionary time in sustaining the climate change value-action gap	Andreas Chai, Graham Bradley, Alex Lo, Joseph Reser

8	2015	Exploring Compatibility Between "Subjective Well-Being" and "Sustainable Living" in Scandinavia	Karsten Bruun Hansen
9	2014	Working time reduction policy in a sustainable economy: Criteria and options for its design	Martin Pullinger
10	2013	Habits, routines and temporalities of consumption: From individual behaviors to the reproduction of everyday practices	Dale Southerton
11	2010	Consumption, time and the environment	Mario Cogoy
12	2002	A time use perspective on the materials intensity of consumption	Mikko Jalas
13	2001	Time and wealth, the role of time and temporalities for sustainable patterns of consumption	Lucia A.Reisch

After reading the articles, various time related topics based on the explained procedure in methodology section were categorized in seven groups. These categories and debates are not separated sharply and have some overlaps. This way of categorization, is a practical method for clarifying use of time in the desired context and in the selected materials regarding the intrinsic limitation of science and scientific methods as well as limitations of this study. Used terms in the selected articles for describing defined categories are shown in Table.2.

Table 2. Used terms for describing defined categories

categories	other used terms
Time use	time as a cost, time as a resource, time footprint, time allocation, activity, state of doing
Time of use	time use pattern, everyday life, demand side, rhythms, sequences of practices, temporal performance, norms, normality, habits, temporality, daily life, common sense, behavioral structure
Time related rebound effect	time rebound effect, time saving, time efficiency, time ecoefficiency, time investment, reduction of working hours consequences,
Time related value-action gap	decision making, dilemma, moral functions, living out, schizophrenia paths, safe heaven
Time pressure	time squeeze, hurriedness, slow movement, accelerated lifestyle, stress, time poor class, time scarcity, time shortage, waste of time, discretionary time
Time related well-being	subjective well-being, quality time, life satisfaction, time preference, meaningful life, Working time reduction, eudaimonic and hedonic well-being, time affluence, enjoyment, welfare, meaningful passage of time, time sovereignty, paid work/leisure time
Social engagement time	social communication, social interaction, voluntary work, social practices, social common management,

4.1 Category debates

Table 3 shows the main time categories discussed in the articles. Three terms - Main, Marginal topic and Not a matter of subject - are used to describe importance of the category in the selected article.

Table 3. Summary of discussed categories by the authors

Smetscheka et al. 2019	
Time use	Main
Time of use	Main
Time related rebound effect	Marginal topic
Time related value-action gap	Marginal topic
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Not a matter of subject
Gram-Hanssen et al. 2019	
Time use	Marginal topic
Time of use	Main
Time related rebound effect	Not a matter of subject
Time related value-action gap	Not a matter of subject
Time pressure	Marginal topic
Time related well-being	Not a matter of subject
Social engagement time	Not a matter of subject
Arbuthnott and Scerbe 2017	
Time use	Main
Time of use	Marginal topic
Time related rebound effect	Not a matter of subject
Time related value-action gap	Marginal topic
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Marginal topic
Buhl et al. 2017	
Time use	Marginal topic
Time of use	Not a matter of subject
Time related rebound effect	Main
Time related value-action gap	Marginal topic
Time pressure	Not a matter of subject

Time related well-being	Marginal topic
Social engagement time	Marginal topic
Aro 2016	
Time use	Main
Time of use	Marginal topic
Time related rebound effect	Not a matter of subject
Time related value-action gap	Marginal topic
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Not a matter of subject
Buhl and Acosta 2016	
Time use	Not a matter of subject
Time of use	Not a matter of subject
Time related rebound effect	Main
Time related value-action gap	Not a matter of subject
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Marginal topic
Chai et al. 2015	
Time use	Marginal topic
Time of use	Marginal topic
Time related rebound effect	Not a matter of subject
Time related value-action gap	Main
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Marginal topic
Pullinger 2014	
Time use	Marginal topic
Time of use	Not a matter of subject
Time related rebound effect	Not a matter of subject

Time related value-action gap	Not a matter of subject
Time pressure	Not a matter of subject
Time related well-being	Main
Social engagement time	Marginal topic
Hansen 2015	
Time use	Not a matter of subject
Time of use	Marginal topic
Time related rebound effect	Not a matter of subject
Time related value-action gap	Marginal topic
Time pressure	Marginal topic
Time related well-being	Main
Social engagement time	Not a matter of subject
Southerton 2013	
Time use	Marginal topic
Time of use	Main
Time related rebound effect	Not a matter of subject
Time related value-action gap	Marginal topic
Time pressure	Not a matter of subject
Time related well-being	Not a matter of subject
Social engagement time	Marginal topic
Cogoy 2010	
Time use	Main
Time of use	Marginal topic
Time related rebound effect	Not a matter of subject
Time related value-action gap	Not a matter of subject
Time pressure	Marginal topic
Time related well-being	Marginal topic
Social engagement time	Not a matter of subject
Jalas 2002	
Time use	Main
Time of use	Main

Time related rebound effect	Not a matter of subject
Time related value-action gap	Not a matter of subject
Time pressure	Not a matter of subject
Time related well-being	Marginal topic
Social engagement time	Not a matter of subject

In following, analysis is organized based on categories. Definitions of the categories and their scope in this study as well as different debates on each category are provided and compared. Analysis of the various used methodologies in the articles is out the scope of this study and interpretations and discussions are focused on the concept of time.

4.1.1 Time use

Discussing Time as a resource to be allocated to different activities is the most repeated interpretation of time in this context. In almost all the defined categories, debates are developed based on the Time use and allocation of time. However, some scholars have directly mentioned Time use, as an issue and provided debates directly concerned about time allocation (e.g. Arbuthnott and Scerbe, 2017; Aro, 2016; Cogoy, 2010; Jalas, 2002; Smetschka et al., 2019) . Practice theories and the explanation that ‘Experiences of time are experiences of practices’ (Shove et al., 2012), describe the main theory and definition for Time debates in these articles.

In the most recently published article in the list, time is discussed considering the emission of the activities it is allocated to. Using the term ‘time footprint’, Smetschka et al. (2019) have tried to show the importance of time in consumption context towards climate change mitigation. The assumption that lack of time leads to spending more money and making not-sustainable decisions, is accepted by authors. They have discussed time as a limited resource which is fairly shared among humans and they have expanded monetary-consumption debates in the climate change context to time-activity debates. They have suggested replacement of ‘spending time with low carbon activities’ with ‘consume less’. (Smetschka et al., 2019)

Although it is important to consider carbon footprint of activities in time sequences, limiting the importance of time regard to consumption, to emission of the activity that it is allocated to, cause missing of some points such as well-being related impacts.

Regarding time as a 'cost', parallel to monetary cost, is the main approach of the Arbuthnott and Scerbe (2017). Based on psychological theories they have suggested that policy makers should find the best combination of activity and money or time costing, for getting the best result in order to mitigate pollution of the natural resources (commons) in individual level. Their theory is 'commons dilemma' which is concerned about harvesting resources and maintaining them by individuals simultaneously. For sustainable performance, they have assumed people should spend money or time. They approve that their group of interviewees are more likely to spend time for disposal activity instead of changing their consumption. (Arbuthnott and Scerbe, 2017)

It can be criticized how they have evaluated time versus money and what kind of relationship between them they have assumed in their assessment.

Aro (2016) has focused on mobility as a time consume practice, which is directly connected to energy consumption, and has discussed its sustainability challenges in Finnish context. Based on practice theories, he describes mobility as a complex process and Time as an element for interpreting this process. He approves sustainable behavior requires time and intrinsically is not adaptable with usual professional life and pleasure leisure time. He also has developed debates to explain connection of mobility practice with norms of society and individuals' well-being which will be discussed more in cross category debates. (Aro, 2016)

With a time-allocating approach, Consumption is analyzed as an activity, with two component, time and commodity, which are affecting the environment. Time is an input for consumption activity. Regarding the limitation of time compared to the plentifulness of materials, Cogoy (2010) explains necessity of material-intensity of consumption and suggests that changing the balance of time and material in consumption activity leads to decrease in environmental consequences of consumption. (Cogoy, 2010)

Time use perspective is used for analyzing consumption by Jalas (2002). The main assumption of the author is that Time and money are not interchangeable so, for sustaining consumption, time is considered as the effective constraint. The subjectivity of consumption practice is the other assumption which strongly is involved in the provided debates on sustainable lifestyle. Jalas (2002) has mentioned that money does not have equal value for all and everywhere and is a subjective issue. He assumes consumption can be limited by time not necessarily by money in affluent countries. (Jalas, 2002)

4.1.2 Time of use

This category, based on allocating of time to alternative activities, is about patterns and repetitions of activities in everyday life. This category is not just about activities and their Time use but about repeating and reproduction and sequences of activities. Routines, everyday practices or temporality of activities is discussed from various perspectives regard to sustainable consumption (Aro, 2016; Gram-Hanssen et al., 2019; Smetschka et al., 2019; Southerton, 2013).

Smetschka et al. (2019), with a functional perspective defines four categories for everyday activities, personal time, household and family time, work time, free time. They consider mobility time for linking activities during the day. Then assess these category's carbon footprint in Austria, to make some analysis on demand side based on activity time. For instance, they have suggested, doing social activities in free time instead of hobbies, can reduce individual's carbon emission. Their other finding is that personal time is less emitting compared to the household time and leisure time. (Smetschka et al., 2019)

Gram-Hanssen et al. (2019) consider showering practice as a consumption case and survey shower timing and inter-related connection of its temporality with other rhythms and sequential practices during the day. Trying to find answer to the question 'what time and how long?' they show that temporality of practices is depended on individual's social group. (Gram-Hanssen et al., 2019)

Aro (2016) is concerned about normality of practices (in this case mobility practice), and its negative impacts on sustainable consumption. In other words, living standards contribute in resisting sustainable mobility. Accepting that sustainability is not routine and norm, he supports the idea that doing sustainable behaviors requires time. (Aro, 2016)

It can potentially be criticized questioning ‘What if sustainable behavior time, be a reason of satisfaction or some quality time?’. It will be discussed more in Time related well-being category debates.

Habits and difficulty of changing them in consumption context is another aspect considered by scholars in this category (Southerton, 2013). Southerton (2013) emphasizes personal rhythms are reproduced and are interconnected with institutions and infrastructures.

Although these authors are concerned about temporal and sequential activities in everyday life, they have seen time with its linear feature, to be allocated to various activities temporally. Thinking about everyday habits and routines as some potential rhythms for understanding time, can provide new perspective for time related debates. For example, daily paid worker and monthly paid worker have various understanding of time.

4.1.3 Time related rebound effect

The term rebound effect is well-known in energy efficiency debates and accounts for not intended results of energy saving. In short saving any resources potentially causes rebound effect and not intended consequences (Buhl and Acosta, 2016). Time as a resource to be saved can cause rebound effect (Buhl et al., 2017; Buhl and Acosta, 2016; Jalas, 2002). ‘Working time reduction’ as a solution for reducing consumption can cause rebound effects regard to consumption (Buhl et al., 2017; Buhl and Acosta, 2016). ‘Working time reduction’ contributes in well-being category as well.

Time use effects of the individual’s opportunities for saving their time because of technological and social innovation, are discussed by Buhl et al. (2017). Time saving innovation leads to alter allocation of time. How the saved time will be spent, is potentially

a cause of more consumption. They use 'time efficiency' term in the same way as 'energy efficiency' term and discuss that energy costs are less than cost of time so using more resources is substituted by using more time and leads to time use rebound effect. In developed society time is saving by using technologies as well and this saved time can be used for high carbon emission activities. They stress that time use rebound effect (time as a resource) should be evaluate with income effect (money as a resource) simultaneously for getting a reliable result regarding rebound effect. They have accepted the interchangeability of time and other resources and in conclusion they talk about services that provides 'quality time' which individuals are not likely to change it with resource-intensive opportunities. They have used 'time investment' for services and experiences compared to 'time saving'. (Buhl et al., 2017)

Buhl and Acosta (2016) have focused on working time reduction rebound effect. They have introduced results of working hour reductions in three categories: time use effects, life satisfaction effects and social engagement effects. The two later ones will be discussed in cross category debates. They find an extent to which working time reduction have positive effects regarding environmental and wellbeing effects. Their findings show that the saved time via working time reduction will be invested mostly in leisure time. They are concerned about income reduction as well and consider that extra income is spent for leisure and traveling. Finally, they conclude that working time reduction liberated time, is not necessarily lead to positive environmental impacts but there could be positive ones based on associated policies. (Buhl and Acosta, 2016)

Jalas (2002) applies non-interchangeability of time and money, as an assumption to this category as well. He consciously avoids integrating income and time use rebound effects in his analysis. He stresses that individuals' reasons for attending activities are so subjective and not simple enough to be assessed by balancing available resources such as time, energy and money. (Jalas, 2002)

Pre-assumptions are not consistent in this category in a same way as it was in Time use category. Time and money are intrinsically different. When people save money, they must

spend that money to gain some real thing to respond a need. But time is a real need per se, it does not need to necessarily be exchanged to something else. On the other hand, people are not able to save time for future use! time is flowing, and it cannot be saved in a same way as money to be re-spent later.

4.1.4 Time related value-action gap

The value-action gap is one of the important issues in sustainability context and climate change mitigation debates. It regards the gap between acceptance of the necessity of behavioral changes and do not apply them in practice. It is defined as the disparity between individual's environmental concerns and their lifestyle (Chai et al., 2015). The role of time in climate change related value action-gap is discussed by Chai et al. (2015). Value-action gap time related marginal debates in other articles, are provided in cross debates section.

Chai et al. (2015) argue discretionary time's importance in reduction of consumption behaviors value-action gap. They have defined this discretionary time as a time which is not spent at work or for necessary personal care activities. Having no time to spend on time consuming sustainable behaviors is considered as a direct effect of time poverty. They have suggested an indirect effect as well, which is about the role of time affluence in configuration of preference for acting sustainable behaviors. They have regarded psychological debates to assess individual concerns about sustainability issues versus their behaviors. Consumption patterns are hard to change for several reasons such as affluence, technologies and social norms and routines which cause a lock-in situation. (Chai et al., 2015)

Habits and routines (as the main obstacle for decreasing the mentioned value-action gap) can be discussed regard to rhythmic feature of time and potentially can provide some new insights.

4.1.5 Time pressure

Time scarcity and lack of time for doing intended activities is known with the term Time pressure. Balance of leisure time and work time indirectly is the reason for feeling stress and Time pressure. Although Time pressure as a notion is involved in eight of the articles, none

of the selected articles are directly concerned about this category. Chai et al. (2015) focus on 'discretionary time', is indirectly about time pressure. Debates on Time pressure category, included in selected articles, are provided in cross category debates section.

4.1.6 Time related well-being

Time related Well-being is about the inside circle of Raworth's doughnut as a limitation for human activities which is shown in Figure 1. Oxford dictionary defines well-being as the state of being comfortable, healthy or happy. In many documents it has been considered like welfare and in some economic context welfare is decreased to income support (Oxford Reference, 2017). In this study beyond monetary aspects, time related aspects of well-being are issue. Well-being is mainly the matter of subject in some scholar's approaches (Hansen, 2015; Pullinger, 2014).

Pullinger (2014), discusses about working time reduction regard to well-being. He finds situations in which working time reduction leads to positive results regarding environment and well-being. In other words, he argues although there are doubts about negative impact of income reduction on individual's well-being, in specific condition regarding people happiness, well-being could be increased. Happiness studies show that relationship of happiness and income or GDP decreases after specific level of income (Pullinger, 2014). So, he explains role of three states of 'having', 'doing' and 'being' in high happiness level. In state of having, happiness will be limited to the basic physiological and psychological needs. In state of doing, 'Time use' and activities are important. Paid work can be part of this state as well (else than being a source of income for happiness in state of having). Other individual's activities are involved in this state of happiness, Spending time for meaningful activities. State of being is more about values and perusing something else than needs and activities for a positive mental state. He stresses mindfulness and awareness are associated in this state of happiness and suggests for sustainable goals, happiness in state of doing and being (Time use) should get more attention compared to happiness in state of having or monetary happiness. (Pullinger, 2014)

Psychological debates on happiness is so subjective and cannot easily be measured unless other humanity and art knowledge be permitted to involve for shaping an interdisciplinary interpretation.

Correlation of well-being and sustainable living is another approach in this category (Hansen, 2015). Hansen (2015) defines ‘subjective well-being’ by two components, hedonic wellbeing which include comfort, pleasure and positive emotions as well as eudaimonic well-being which includes personal flourishing, social relations and generally meaning in life. Subjective well-being is not increasing by increased prosperity after some level. He argues being concerned about environmental issues will increase individual’s subjective wellbeing. sustainable living gives some meaning to individual’s life and results in more happiness and well-being. (Hansen, 2015)

This conclusion is different from the arguments that are provided about contrast between outer and inner circles of doughnut economy by Raworth (2017) as well as the fact that sustainability behaviors cause extra cost (monetary or time consuming).

4.1.7 Social engagement Time

This category originally can be considered as a subcategory of ‘Time use’, because we are talking about the time that is allocated to social engagement practices, in a same way that we discuss about mobility time or caring time. As the social engagement and volunteering is an important topic in social capital and human capital discussions, Social engagement time is categorized separately to make it clear for future time related discussions. General debates about social engagement are included in this category if they are discussed as a time-consuming activity. The debates regard to this category are provided in cross category debate part.

4.2 Cross category debates

Aside from the main issue, selected articles, have provided marginal debates combining various defined time categories. Classification of debates in same cross category topics lead to understanding better how time is used and involved in sustainable consumption

justifications and discussions which is our goal in this study. Table 4 shows distribution of these debates among selected articles.

Table 4. Distribution of cross category debates. Numbers stand for the articles in Table 2.

Category	Time use	Time of use	Time related rebound effect	Time related value-action gap	Time pressure	Time related well-being	Social engagement time
Time use	1, 3, 5, 11, 12	11, 5, 1, 10, 2	4	3, 1, 7	11, 3, 1	12, 11, 5, 3, 1, 9	3
Time of use		1, 2, 5, 10	-	10, 8, 7	2	1, 8, 7	-
Time related rebound effect			4, 6, 12	4	6, 4	1, 12, 13	6
Time related value-action gap				7	1, 7	3, 8, 7	8
Time pressure					-	1, 7	-
Time related well-being						8, 9	9, 8, 1
Social engagement time							-

Overlapping of the categories, which was mentioned in previous section, is more obvious in the cross-category debates. Similar justifications are displaced in different cross category debate based on the used terms. So, this categorization and cross category debates are not solid but some more sentences to clear the interpretation of Time in the articles. Potentially

there could be 21 different cross category debates, which are almost covered in the selected article. Three possible debates which are not found in the reviewed articles are correlation of Time of use - Time related rebound effect, Time of use - Social engagement time and correlation of Time pressure - Social engagement time. In the next lines cross category debates are summarized and category related used terms are distinguished with *italic* character.

Time use – Time of use

Time use activities are repeating in individual's *everyday life* and any analysis of time use *activities'* carbon footprint can be better understood when the *patterns of everyday life* and limitations for changing these *patterns* are considered. Social *norms* affect individual *activities* and consumption. Individual is a part of family, society and economy, whose *activities reproduce* in these systems. (Smetschka et al., 2019)

Individuals' social group affect simultaneously on their *Time use activities* as well as *pattern* and *temporality* of those activity (Gram-Hanssen et al., 2019).

Normality affects individual's *mobility activity*. *Common mentality* defines appropriate mobility (Aro, 2016).

Understanding the relationship between *activities* and their *temporality* is necessary for shaping a sustainable *lifestyle*. Disposition of *actions* along day time and *sequences* of practices should be interpreted together. (Southerton, 2013)

Analysis of *time use* leads to understating consumption *habits* and routines (Cogoy, 2010).

Time use – Time related rebound effect

Innovations as well as *resource efficiency* progresses result in alternative *time allocation* (Buhl et al., 2017).

Time use – Time related value-action gap

Time affluence like monetary affluence pushes individuals' *decision-making* towards more sustainable *actions*, For example, walking instead of using a car (Smetschka et al., 2019).

Type of sustainable *activity* (disposal or consumption) and the cost to be payed (money or time) affects individual *decisions* regard to psychological theory of *dilemma* (Arbuthnott and Scerbe, 2017).

Sustainable consumption *activities* are usually time consuming and it is potentially a reason for sustainable activities *not to be done* (Chai et al., 2015).

Time use – Time pressure

Allocating time to all individual's needs cause feeling *time pressure*. *Time squeeze* can lead to high emission *activities*. (Smetschka et al., 2019)

In the modern life '*speed*' is an issue so *time scarce* is an issue and *time cost* should be assessed and considered. Time oriented solutions such as '*slow movement*' can take part in managing policies of shared resources. (Arbuthnott and Scerbe, 2017)

Time scarcity has been a reason for material-intensive consumption, regard to environmental issues proportion of *time use-commodity use* in day life should be changed (Cogoy, 2010).

Time use – Time related well-being

Final aim of *activities* is individual's *life quality*. Instead of 'consuming less', policies should be concerned about 'spending time with *pleasant low carbon activities*'. (Smetschka et al., 2019)

People who are asked to *donate time*, feel different rate of *well-being benefits* compared to people who are asked for donating money (Arbuthnott and Scerbe, 2017).

Well-being related excuses such as *comfort* or *freedom from others* as well as *time sovereignty* are announced in interviews as the reasons for using private car instead of public transportation (Aro, 2016).

Happiness (in state of doing) in passive *activities* such as watching TV, is lower than activities which are more directed and purposeful (Pullinger, 2014).

Individuals whom their basic needs are responded, *allocate their time* to consumption activities, because of *pleasure* and *enjoyment*. Pleasure of consumption activity can be maximized via balancing used time and involved materiality. (Cogoy, 2010)

Needs are subjective and *welfare* is relative and cultural dependent. Goal-oriented consumption can be replaced by *playful activities* which are more related to identities and can make the time duration more *meaningful*. (Jalas, 2002)

Time use – Social engagement time

Shared resources (such as ecological environment) are affected by individuals' *actions*. individual's self-interest decisions have some impacts on the others welfare (Arbutnott and Scerbe, 2017). it can be considered more about 'social engagement' compared to 'Social engagement time' which is our matter of subject.

Time of use – Time related value action gap

In high income societies, consumption *patterns* are hard to be changed because they are locked-in social *norms* and habits (Chai et al., 2015).

Social norms and cultural values strongly affect individual behavior and *decisions* regard to sustainability issues (Hansen, 2015).

Changing values for sustainable ones is not enough and *habits* and *routines* should alter but changing habits is hard (Southerton, 2013).

Time of use – Time pressure

More consumptive *practices* are more convenient regarding modern high *pace* of life. For example, *daily* shower versus *weekly* bath. When practices with the same sequences, reproduce by major of people, lead to rush hours and their extra consumption consequences.

This rush hours and inter connected social *rhythms* are related to feeling of time *pressure*. (Gram-Hanssen et al., 2019)

Time of use – Time related well-being

Level of income and social infrastructures shape consumption *patterns* (Smetschka et al., 2019).

Discretionary time can weaken habit loop in favor of practicing more sustainable consumption behaviors (Chai et al., 2015).

Subjective well-being potentially is a motivation for changing *routines* in *everyday life* (importance of the correlation of the sustainable consumption and subjective well-being). Sustainable consumption should not only be known as an ethical behavior, there can be some time related well-being policies. Eudaimonic aspect of well-being (*positive feelings* beyond pleasure) can lead to modification of everyday life. (Hansen, 2015)

Time related rebound effect – Time related value-action gap

Associated factors in individual's *decision-making* should be considered in analyzing *rebound effect*, due to the fact that people are not theoretically 'rational' in practice (Buhl et al., 2017).

Time related rebound effect – Time pressure

In speed up developed societies, time saving is an issue (Buhl et al., 2017; Buhl and Acosta, 2016).

As it discussed, time cannot be saved. It may be the reason why we feel time pressure, we try to fill all the seconds with activities and this is the pressure. The relationship of time and activities may have other aspects else than relationship of a resource (Time) to be allocated to consumer (activity).

Time related rebound effect – time related well-being

Individual's *preferences* can lead to time use *rebound effect* (Smetschka et al., 2019).

Increasing *leisure time* leads to a new balance of time and income as resources to be spent in activities. Potentially *life satisfaction* increases by increasing leisure time, because time can be allocated to individual's *preference*. As income decrease through saving time by reduction of working hours, a smart balance of time use can increase well-being. (Buhl and Acosta, 2016)

Substitution of household activities by market services (for time saving and *welfare*) is associated with time use *rebound effect* (Jalas, 2002).

Time related rebound effect – Social engagement time

More time for *voluntary social activities* is a potential result of *saved time* via working time reduction. People do not allocate their *saved time* to *social engagement* per se. (Buhl and Acosta, 2016)

Time related value-action gap – Time pressure

Lack of time affects individuals' *decision-making* towards less sustainable *actions* (in this case mobility) for example, driving instead of walking (Smetschka et al., 2019).

Time squeeze limits individual's consumption *choices*. In affluent societies people do not have enough time to enjoy their prosperity. On the other hand, time squeeze affect forming preferences. (Chai et al., 2015)

Time related value-action gap – Time related well-being

Psychological theories support that people avoid losses in *decision-making* although there be some gains. In other words, losses are considered more than the same gains. It can be an explanation for their behavior regard to common resources. (Arbuthnott and Scerbe, 2017)

Practicing sustainable behavior is related to individuals' *preferences*. *Discretionary time* reduces *value-action gap* (Chai et al., 2015).

Some people do not perform sustainable behavior because neglecting such a trouble lets them *feel safer* (Hansen, 2015).

Time related value-action gap – Social engagement time

Sustainable behavior of peoples is dependent on the extent to which individuals know themselves connected with others and living world (Hansen, 2015).

Time pressure – time related well-being

Reduction of *time pressure* as a result of working hour reduction can increase *life quality*. In other words, more leisure time reduce time pressure. (Smetschka et al., 2019)

Discretionary time reduces *stress*. When the *stress* decrease people are more likely to practice sustainable behaviors. (Chai et al., 2015)

People try to use their tiny times and they do not want to waste their time, so they feel stress and time pressure. What do we mean by wasting time? when time is wasted? does it waste when it is not converted to money? or pleasure? An answer is that time is wasted when it is not quality time. when people are busy for filling their time with an activity as soon as possible they cannot be mindful about the activity to make it unjoyful.

Time related well-being – Social engagement time

Hobbies can be replaced by *social activities* and cause less emission if the money which is not spent for hobbies be not spent for some more carbon emitted activities. Social engagement and *volunteering activities* are the less carbon emitted ones. (Smetschka et al., 2019)

Spending time *volunteering* increases individual's *happiness* (Pullinger, 2014).

Social relationships lead to eudaimonic aspects of well-being which are more about meaning of life and self-realization. Beyond the interpretation of 'rational man', individuals understand their-self in *social interactions*. Sustainable lifestyle potentially can increase

some aspects of well-being which are beyond responding primary needs and comfort *pleasure*. (Hansen, 2015)

4.3 Time and wealth

The earlier published article which surveys time as an effective parameter in the sustainable consumption concept is 'Time and Wealth' by Reisch (2001).

Time previously has been considered as a constraint not an intrinsic value while in this article 'wealth in time' is an issue beside the common idea of 'wealth in goods'. Conventional grasp of time as wages per hour in dominant economic model of consumption is criticized and a qualitative understanding of time factor in sustainable consumption is provided. Considering time factor as an analytic category at the conceptual and strategic level regarding sustainable consumption, Reisch (2001) links time and strategic level of sustainable consumption. (Reisch, 2001)

Sustainable lifestyle, sufficiency, unpaid work or volunteering are matter of subject in this article and the author emphasizes that extra time directly will not lead to more sustainable lifestyle, but it should be managed. One of the essential conclusions of the debates is that people do not want 'more free time' but 'enough time for meaningful thing'. (Reisch, 2001)

5 DISCUSSION

5.1 Analysis results

Attention to time as a matter of subject for the sustainability consumption concept began in early years of this millennium. As we go backwards on the timeline, the debates on time, within published articles, are deeper and more concerned about the essential meaning and practical knowledge of time. Recent authors have developed arguments based on some basic accepted definitions and have not deeply evaluate or discussed the concepts of money and time. Regarding sustainable consumption and sustainability in general, some essential conceptual deep discussions have disappeared in recent decades and sustainability ideas are adapted in favor of conventional systems of business and politics as usual. So, reviewing of the basic concepts of sustainability in this context is needed for getting back on the path.

An example of this not-consistency about definition and use of time is obvious in the 'Time use' category debates. Building discussions on the same theory, using the same terms - time use approach - and regarding time as a resource, Jalas (2002) has used a different essential assumption about non-interchangeability of time and money and this assumption affects his methodology and results. In other words, although other authors have considered commodities (included money) and time as two separated flow of inputs to activities (Arbuthnott and Scerbe, 2017; Aro, 2016; Cogoy, 2010; Smetschka et al., 2019), they talk about a balance between these two resources which alters to the assumption of the Jalas (2002) and Reisch (2001) about not-interchangeability of these resources. They replace focus on money and consumption with time and activity. Any attempt to find a balance between time and monetary flows shows the importance of the clear realization of money-time relationship. Regarding that all these articles refer to the practice theories and its definitions, this dichotomy shows that there is not a proper realization of time within sustainable consumption debates.

Additionally, it causes doubt about the basic definition of time in this context and seeking new interpretations for time. Time is defined as a resource to be allocated to activities and it is understood by activities which is allocated to them. Defining time as a resource is a good

base for economic discussions but it is not enough since the debates are expanded from an absolute economic context to the social and sustainable consumption issues. Why this definition is not complete? time is defined as a resource, in a same way that money is, while time and money are intrinsically different. Money should be exchanged to something else to make pleasure. What about time? Should time be evaluated by activity it is allocated to that? I think not necessarily. Here is an example about kindness. when a person is kind, they feel pleasure even if there is no one around them. Similarly, time and its quality and final pleasure can be evaluated beyond the activities happen in that duration. Of course, decreasing time to a resource helps us to provide some debates for managing consumption and activities' carbon footprint, but we should be aware that time has other aspects that can potentially be utilized in policies. when we care about quality of time as discussed previously in Time related well-being category debate, this is not the 'activity' which is important but the 'mindfulness about time and its quality'.

Money to be spent and time to be allocated are not in balance and it causes extra pressure on time and we feel it as time pressure in our daily life. There is a similar debate about balance of time and energy. Assume that we have unlimited access to money or energy. Does unlimited access to energies (considering renewable ones) threat our limited time? In the same way, does unlimited money acts as a pressure on our limited time? Do we have enough time to spend the money which is caused by unlimited growth? Do we have enough time to use unlimited renewable energies that we have access to them? Our daily time is limited as well as our monthly time. Can it be a scale for making some limits for money to be spent daily or monthly and for the energy to be used daily or monthly? Time practically is defined by periods such as daily, monthly or yearly. Can we define a period for energy use or money spending in a same way?

If we assume that time is exchangeable, is money an ideal exchange means for time? People lose some value about their quality time when they exchange their time with money (unless their working hours be quality time). Reduction of working hours is supported by this idea because of the extra value that people earn (or I would say people will not lose) via exchanging their time with money.

Another result of this study is stressing on time potential for achieving sustainability goals. The more people get aware of the time's value as a resource and stop evaluating it by money, the more they will sustain their life and decrease their consumption. The other individual resources in a core economy mentioned by Raworth (2017, 79, 80), should be evaluated beyond their calculated monetary value. It should be the primary step for the suggested solutions concerned reduction of paid work hours by Gough (2017, 198). For example, if people do not accept to easily exchange their Time with money, they won't have money at hand to spend during the extra available time so, they fill their free time with activities that will not include unnecessary consumptions.

Individuals measure time using watches and calendars usually considering it as an objective reality. Although realization of time sounds very subjective and dependent on person mind, it is inevitably influenced by and in connection with objective world.

Going back to the "sustainable development" definition, the two words, "future" and "generation", are exposing the time presence and importance in sustainable development as well as describing two features of time. Past, present and future are introducing a simple timeline. Realizing time as a line carries events along, is familiar to us. Thanks to the simplified scientific diagrams which have well demonstrated time with an arrow going forward to no end. But do people realize time in real life as a line? Before the established line-shape form of time, historically people have realized it by natural rhythms, days and nights, springs and falls. This repetitive feature of time in "sustainable development" definition can be extracted from the word "generation".

5.2 Limited time for making changes

One of the critical issues in sustainability science, specifically climate change and global warming, is limited time for making changes. Aiming to decrease GHG emissions and to affect policy making, scientists have progressed alternative scenarios all dependent on the proper changes in a limited time. Proposed legislations and policy targets show the step by step and time dependent necessities for remaining in safe zone. For example, respect to 2° C limitation, emission should decrease at least 60% by 2050 compared to 2010 (Weaver 2007).

Changes in industries, social and political behaviours are achievable if we were not faced deadlines. Although time limitation, which is confirmed by scientists, is supposed to be a strong motivation for rapid changes in environmental behaviours, in practice it does not work.

Regarding deadlines, there are some psychological researches which show people respond to the deadlines as late as possible (Valentina, 2009). It is not enough to draw deadlines and out loud the threats and expect people acting in a sustainable way. Psychological studies show people react to threat based on its clarity and hazardous level as well as situation in which person face the threat. In each combination of threat-situation They may ask for help, run away, freeze or they may defensively threat, attack or assess the risk (Ein-Dore, 2014).

Individuals' reactions to climate change threat, may be assessed as a behaviour in respond to a threat. In a simplified sense, global reactions to climate change and deadlines may also be assessed to some extent with the similar behavioural actions. Considering people reactions to deadlines for paying money, they react as late as possible to decrease the probable loose of "value" (Valentina, 2009). In climate change context there is no money related deadline, but general behaviours of actors follow the same pattern. It worth to ask if actors feel the threat or prefer to postpone their reaction to get closer to the deadlines or other eco-social debates, but the notion which is relevant to our analysis is "value". Actors react when they are conceived that they gain more value for their in-time reaction. Improving value, based on people realization of time and "time pressure" can be a mean for changing behaviour towards sustainable consumption.

An important issue to be mentioned here is that people behaviours cannot be easily simplified in a complex society system. Failure of "rational economic man" (Raworth 2017, 94) in contemporary economic debates is an example. Studying the reason for deviation of people from ideal behaviours is a topic of cognitive researches (Raworth 2017, 112). The other important point is that although people behaviour can be studied as an objective matter, their behaviour can be externally formed as well. A similar example works here. Some surveys showed getting familiar to the "Rational economic man" concept, changed the response of economics student considerably compared to other students who did not have any idea about

the abstract definition of rational economic man. The "model of human" in classical economy debates substitute by the "model for human" in neoliberal economy (Raworth 2017, 100). People can be taught to react assessing risks and decide to do wisely (Raworth 2017, 114). So, explanation of time and its practical realization, may affect individuals' reactions towards sustainable consumption.

According to Gough (2017), welfare state's goals are summarized in redistributing income, promoting social consumption and social investment (Gough 2017, 118). He discusses social investment for building human capabilities (Gough 2017, 123)

Capability or understanding of one's capability, affects their reactions to the limited time. Do technological devices increase human capabilities? My answer is 'not'. Although airplanes have made it possible for man to be at two points thousands of kilometers apart in one day or less, it cannot be considered as a promotion in human capabilities. It is a 'dependent capability' and not about self-sufficiency. This 'dependent capability' is directly related to consumption rate while the term capability implicates productivity and self-sufficiency.

Practical grasp of time and person capabilities are corelated. Consider two person who have train tickets at 8:00 in the morning both wake up 7:45 in the morning. The one who lives near the station, react rapidly to get ready for going to the station to catch the train, because he is aware of his capability for making it. The other one who lives in the other side of the city feel shortage of time. He knows he cannot make it so he will not react in a same way. This is a simple example about how our abilities make different understanding of time and cause various reaction. In short, people capability gives meaning to the time period and is essential for their decision making and reactions.

5.3 Research limitations and future works

Time is a concept which is not limited in a specific domain of human knowledge. Regarding goals and scope of this study, debates are limited in scientific framework and many humanity branches of knowledge such as philosophy and art are left out while there are many

discussions in them, on topic, along the history of humanity. Even inside the science boundaries linguistic, cognitive, future study and many other debates are not included.

Regarding methodology and material selection, selected materials are limited to published articles in scientific Journals while there are some debates provided in other scientific publications which are left out of our scope. Moreover, selection plan is partly subjective and access to some of the articles is behind pay wall in the used database.

Additionally, it should be concerned that "consumption" is frequently used in sociological documents as a social activity with alternative proposes else than simple economic goals. Some of the "other goals", are categorized under the term 'want' but there are some goals such as identity (Jalas 2006, 131) which cannot easily be considered as wants. So, beyond needs and wants there are some reasons for consumption that must be considered in future investigations.

Both linear and rhythmic features of time are discussed in alternative scientific domains. Regarding its linear feature, time is assessed as a limited resource that must be allocated to events and practices to happen next after each other. but, in practice time is realized based on the rhythms (Shove et al. (ed.) 2009, 17-18). Various rhythms are combined and harmonized together to make symphony of societies, if it is ear-catching or ear-splitting. Along the history of human life, human body has been the main tool for measurement and understanding of the world around him. In his 'Vetruvian man' drawing, Leonardo da Vinci has shown the spatial aspect of this fact. The temporal aspect of Vetruvian man can be understood by analyzing natural rhythms of human body as well. An image of Leonardo da Vinci's Vetruvian man is added to Appendix 1.

Actors of various subsystems in a society who act in specific context with their own time scale, rhythms and culture, have alternative grasp of time. For example, in politics the dominant rhythm is election period which affects decision making in governments and parliaments. There are some other rhythms such as 10 years or 20 years development plans. Another example in business context is a company which its yearly or quarter business report defines the business plan and their investments. In one sense it refers to every single person,

with its own natural body rhythms, its own story and understanding of world, Its own lifestyle and everyday decision-making. In addition, in the society as a complex system all these different rhythms define with each other. One cannot separately analyze them. Economic rhythms cannot be analyzed without considering rhythms contribute politics, culture and everyday life of individuals.

Interpretation of time by its rhythmic feature empower us to get rid of the 'time limitation' as a certain pre-assumption. Realizing time as an infinite resource instead of a finite one leads to alternative results. One may say that the life period which is limited between two strict points - birth and death - is an obvious reason for time to be finite. But in practice the lack of time is not about life period but about the rhythms in everyday life.

At last but not least, the desired society and the desired future can be built, as it is experienced in the history of economy. Are people satisfied behaving like rational economic men and women? Are they satisfied converting their time to money and buying goods and services? What if in society people behave in other way? What if they be satisfied and experience quality time in other way? Let's think of human who want to spend quality time for themselves, for their family, for their society, for providing free services. Let's change the future by thinking and sketching a fairer world.

If we limit ourselves in science borders, we might lose many effective parameters in human society. Economics was an art and it converted to a science in recent years (Raworth 2017, 32). utilizing the example of Raworth (2017, 35), calling the GDP a stranger cuckoo in economics nest, I want to call science a cuckoo in human life. Science has been the foundation of our flourished civilization, but it is the time that we remember other aspects of human being.

Sitting on the beach, inhaling and exhaling, you feel the time has stopped. Although dial watch shows the uninterrupted tiny steps of seconds following each other, your grasp of time duration is totally different. Seconds and minutes slow down and time expands.

6 SUMMARY

This study surveyed definition and use of time in the sustainable consumption context. Regarding climate change and its consequences for human well-being, scholars have developed various explanations such as planetary boundaries and Raworth's doughnut, to show environmental limitation for human activities. Sustainable consumption has emerged as a concept criticising current pattern of consumption in developed countries.

People spend their available resources such as money and energy to cover their needs and wants. In this context time is generally defined as a resource to be allocated to daily activities. In the other words people consume resources and money as well as time for their well-being. On the other hand, consumption as an activity is time consuming. Regarding the relationships of sustainability, consumption and time, this study's main question is formed. Necessity of sustainable consumption for fulfilling environmental and well-being goals and effectiveness of time in consumption concept, lead the researcher to investigate time definition and use in the suggested context.

Concept of time is used vastly in the different branches of science. In this study the debates are mostly limited to environmental science, economics and sociology which cover sustainability and consumption concepts.

Using qualitative content analysis as the method of research, the concept of time is surveyed over selected published articles in the past 20 years. This investigation is conducted by introducing seven time-related categories which have been appeared within articles. Used terms regarding each category are distinguished and emergence of categories within articles is assessed and finally, cross category discussions are extracted from the literatures.

Considering the importance of the relationship between money and time, there is not a unique approach in the presumptions within the selected documents. Interchangeability or not-interchangeability of time and money is an effective assumption which is not discussed in recent publications. Defining time as a resource and recognizing it by the activities which it is allocated to them is generally accepted by scholars, but it seems more basic assumptions

such as the mentioned one about interchangeability of time and money lead to alternative results towards sustainability. Time related well-being and quality time are topics to be investigated more in future works regarding sustainable consumption.

Sustainability, consumption and practical understanding of time are completely relevant to human life. Achieving the global goals for more sustainable world is possible if different aspects of human science and knowledge are involved in shaping our understanding of the problem.

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Leonardo da Vinci Vetruvian man

