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Systemic Innovations as Moderators of Behavioural Changes in Consumption Decisions – A Practical Approach for Food Value Chains

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Abstract **- This article is aimed at identification of the concepts of system change and systemic innovation especially in food industry and food value chains. The necessity of systemic innovations in the food value chains is emphasized. The behavioural economics approach is clarified and contrasted with the traditional neoclassical economics approach. Global challenges in food value chains are also in short dealt with. A practical insight is given for characterizing and steering consumer decisions by presenting a newly developed method for the purpose, the so-called Behaviour Change Wheel (BCW).**

Especially in the field of private consumption it is possible to steer the behaviour of people into the desired direction. In the field of production the means available for the public sector are mainly incentives or sanctions affecting to the economic position of firms. There are expectations that interventions and policies for changing consumer behaviour can be characterized in a practical way with the help of BCW in the future. Policy-makers could easily use the method in planning and steering changes of behaviour. However, consumers cannot solve the world's food and nutrition problems alone. Entering to the solution provides far-reaching changes in the whole socio-technical system.

Keywords **- Systemic innovation, System change, Behavioural economics, Food value chain.**

I. INTRODUCTION

Along with the explosive global population growth and rising standards of living of many nations the world's food and nutrition problems are getting worse and worse. Simultaneous changes are needed in all parts of food value chains, both in demand (consumption) and supply (production) side. The developing behavioural economics theory tries to give better tools for understanding consumer behaviour. It has many advantages compared to the traditional neoclassical economics theory.

As a result, consumer decisions can be more precisely affected and steered by the government. A newly developed method could be applied by the decision makers for this purpose in the future.

II. CHANGING THE BEHAVIOUR OF CONSUMERS

According to the dominating traditional paradigm in microeconomics, actors in an economy are rational and selfish in maximizing their own benefit (that is, utility) under existing limitations of activity and on the basis of their own preferences. This thinking is known as the so-called *rational choice theory***.** In economics it has led to a kind of neoliberal – often extremely liberal – thinking. It has seen almost all interventions of the public sector in the operation of markets as a negative matter.

At the global level, demolition of regulation in the economy, liberalization of trade and industry, privatization of public firms, vast tax reductions, reduction of public expenditure (esp. social security expenditure), down-sizing of administration and abolition of control of global capital flows are concrete expressions of the neoliberal ideology. *Market globalism* seeks to endow 'globalization' with particular values and meanings [1].

The rational choice theory has strongest been challenged by the so-called *behavioural economics.* Its research orientation has been strongly empirical and the real life has provided abundantly examples on that peoples' behavior is not often rational, but emotional and short-term. The U.S. economist Thorstein Veblen (1857-1929) was the first to notice that economic behaviour is guided by psychological factors, such as fear or status-seeking as well as rational self-interest [2]. Daniel Kahneman and Amos Tversky found that people commonly violate economists' standard assumptions about behaviour, particularly when consequences are uncertain. People were found to be affected by the way a decision is presented, and responded in ways that violate standard theory [3]. This paper outlined a theory that marked the start of a new branch of study now known as behavioural economics.[1] Other researchers, who have been criticizing the rationality assumption before Kahneman and Tversky are for example the U.S. economist Herbert Simon in the 1940s and the French economist Maurice Allais in 1953, and after them the economists Andrei Shleifer and Lawrence Summers in 1990 and the U.S. psychologist and economist Dan Ariely in 2008.

In a research report briefing published by the New Economics Foundation (NEF) the behavioural economics approach is summarized and contrasted with neoclassical economics, where the assumption is made that humans are rational and maximize their individual self-interest.[2] The writers' aim is to change the analytical framework for policy as well as to maximize the impact of policy interventions. In the summary, they also hope to reduce unintended outcomes arising from making decisions based

[1] The 2002 Nobel Prize Winner in economics (together with Vernon L. Smith) David Kahneman has himself considered Richard Thaler's research article [4] "Toward a Positive Theory of Consumer Choice" (1980) as the founder of behavioral economics.

[2] Behavioural economics: seven principles for policy-makers, written by Emma Dawnay and Hetan Shah, NEF, London 2005. The Briefing forms part of NEF's wider programme of work on Theoretical New Economics, which looks at how non-mainstream economic approaches are of relevance to policy-makers.

solely on a neoclassical economic analysis. The briefing lists seven principles for policy-makers. These should have effects on decision-making process:

1. Other people's behaviour matters
2. Habits are important
3. People are motivated to "do the right thing"
4. People's self-expectations influence how they behave
5. People are loss-averse
6. People are bad at computation
7. People need to feel involved and effective to make a change.

Social learning is a process by which we subconsciously take in the behaviour of others to learn how to behave. Having to make a conscious decision on how to behave, our sense of social identity is important [5]. Psychologist Albert Bandura showed that people learn by observing what others do [6]. Efforts to create a change in peoples' behaviour could be useful to focus on the types of people who will help promote wider change. Psychologists Tajfel, Billig and Turner have shown that part of our social identity comes from those groups with whom we associate [7]; [8]. To make a sustainable intervention in the consumer behaviour, policy-makers should consider shifting preferences in the medium term, instead of pursuing immediate effects. Once they have identified the particular behaviour they want to change, they can evaluate the role of social norms in influencing this behaviour.

The role of habits in changing behaviour must also be considered. The theories on changing habits generally involve first *unfreezing* the subconscious action and raising it to a conscious level. This is later followed by adopting the new behaviour.

People are motivated to "do the right thing". Neoclassical economics with its 'rational man' does not pay any attention to this. Experimental economists, in turn, have found that 'fairness' is often important to people [9]. Policy-makers should consider how people perceive the behaviour they are trying to change. This matter has a great importance when potential sanctions or rewards are planned. Several relevant examples to policy-makers are given in the paper *Introducing Procedural Utility: Not only What, but also How Matters* by Bruno Frey, Matthias Benz and Alois Stutzer [10].

Leon Festinger developed *the cognitive dissonance theory*, which states that people feel uncomfortable when they feel a clash or 'dissonance' between their actions and attitudes or values [11]. Policy-makers should use this knowledge to get people to make commitments, and as strong commitments as possible.

Neoclassical economics assumes that people are neutral to loss or gain, but they are expected to have a preference on risk; that is, they are either risk-takers or risk-avoiders. However, in behavioural economics theory it has been shown that people value losses more than gains [3]. For instance, peoples' 'willingness-to-pay' (or buying price) is not the same as their 'willingness-to-accept' (or selling price) in determining economic values for environmental costs and benefits. It is usual for the latter one (selling price) to be up to 20 times the first one (buying price) [12].

According to the NEF report briefing (Dawnay and Shah), we are bad at calculating things, especially probabilities, and our choices are strongly influenced by how a problem is presented to us (i.e. the framing effect). We also underestimate the importance or relevance of something that might happen in the distant future. We jump quickly to intuitive answers, which can be wrong, even to very simple mathematical questions [5]. Policies involving financial incentives or disincentives should take account of people's internal biases and intuition about probabilities.

A participatory approach to problem solving can be highly motivational and effective in encouraging behaviour change, as well as making people happier [5]. Policy-makers should note that contrary to the standard theory, too much information or choice could be counterproductive. They should be aware that people do not necessarily want more choice [5].

III. Global Changes in Food Value Chains

A. Globalization-induced Changes

The globalization process has drastically changed traditional value chains of goods and services. National clusters have been broken down or at least splittered into ever smaller parts or components. In Finland, our ICT cluster and forest cluster serve as good examples of this.

In the world economy, the so-called Second Great Unbundling is underway [13]. This splittering of value chains is also seen as changes in operational structures of firms.[3] Enormous growth in many global networks and lengthening of food value chains have caused a situation, in which it has become more difficult to trace the origins of food. Organizing of a functioning food supply in all conditions meets ever greater challenges in the fields of technology, logistics, legislation as well as marketing.

The importance of food inspection as the guarantee of food safety and product quality is growing. Globally, the regulation of food chains is multi-level, containing local, regional, national and international regulations and orders. In this context, the future of local food and biodynamic food looks bright. Consumer attitudes and consumption habits are rapidly changing to this direction already. On the global scale the continuation of this positive change provides adequate availability of proper land for cultivation. The latest development in Africa and South America, where the foreign ownership of land is increasing, hampers the achievement of the goal. Local production and consumption of food would slower the centralization of food chains and prevent the growth of the influence of large producers. It might also have an effect on keeping food prices more moderate.

B. Effects of the Climate Change and Population Growth

[3] The First Unbundling once made the Great Industrial Revolution possible. It was the unbundling of production and consumption, which led to the rapid growth of world trade and economy.

The commonly accepted view of researchers is that the climate change and the world population growth are the greatest challenges for adequate nourishment supply of humans in the future. Even now the ecosystems of the world are severely threatened. The main reasons are people's growing incomes and their current consumption models and trends.

Teagasc is Ireland's Agriculture and Food Development Authority in Carlow. Its task is to support innovations in agriculture and food sector and wider scientific innovations in bioeconomy, which improve profitability, competitiveness and sustainable development [14]; [15]. According to Teagasc, the changes needed to secure the sustainable utilization of scarce resources, do not only depend on technological breakthroughs, changes in consumer behaviour and renewal of markets, but also on a successful operation of some multilateral system of governance [16]. This system should be built first, because we have to answer questions like "Who will lead the change?" and "Who makes decisions?". We need international collective cooperation to meet the challenges. Even if GM (gene-modified) plants may in the future be an important means to improve crops and quality of food, they cannot alone solve the problems of nourishment supply and quality. It is clear that we need a systemic change covering the whole food chain.

IV. System Change and Systemic Innovation

A. System Change

A socio-technical system consists of large amount of parts. Among these are prevailing technology, prevailing regulation, consumer choices and operation of markets, significance of culture, infrastructure and logistics networks. Many of these need supranational regulation, which can be realized by both public and private operators. Socio-technical systems are dynamically stable combinations of institutions, technologies, policies, science, culture, markets, regulations, practices and networks, which determine the normal progress and use of technologies [17]. Geels and Kemp have defined like this: "We understand systems at the sectoral level as socio-technical systems, made up by a cluster of elements, involving technology, science, regulation, user practices, markets, cultural meaning, infrastructure, production and supply networks. This cluster of elements forms a socio-technical system." [18]. Geels and Schot [19] have created a model of socio-technical change, by which changes of the system (or regime) can be assessed.

Such external factors as the climate change and its effects on living on the Earth pose pressures to the prevailing socio-technical system. They strengthen sustainable alternatives of production and consumption. Socially responsible firms are successful and firms with a weaker responsibility are suffering, so as to gradually loose their competitive positions and disappear.

A system change is always a wide-ranging simultaneous change of operational models, structures and their interactions. In food value chains it would mean a change that has effects on the whole chain, from agriculture to the consumer. An example of the complexity of a systemic change could be GM food stuffs. Their widespread introduction would provide a social change that is multi-dimensional. It would contain changes in technologies, legislation, education, production and consumer attitudes. The matter is connected with the functioning of several socio-political sectors in a very complex way. Their mutual interaction would enable a change, that is systemic by its character. It would provide new connections between various policies and their coordination for changing the system in the long run.

B. Systemic innovation

System approaches emphasize interaction and interdependence between various actors [20]. Innovation in firms takes place in interaction and interdependence with their environment. System approaches cover both product and process innovations. They also emphasize the importance of institutions. They are not formal theories, but sooner approaches or conceptual structures.

Systemic innovation as a concept derives from the research of business management and technology management, which is one of the three research orientations of systems. The others are the innovation systems research and the research of socio-technical system change. A systemic innovation is a product, service or solution that is tightly connected with surrounding systems and environment. Different from an autonomous innovation, the development and commercialization of a systemic innovation provide changes in supporting products, services, operational practices and infrastructure [20].

Systemic innovations are necessary for producing and governing changes of the socio-technical system. Productivity and the objective of economic growth guide us further according to pressures set by international competitiveness. However, they are superseded in preference order by the objective of sustainable development. This means that long-term goals are preferred to short-term profit objectives. It also means a great change in human behavior both in market demand and market supply. To change behavior is difficult and slow, but changes have clearly already started.

Chapter 1 of this paper dealt with the characteristics of consumer behaviour. The changes needed are far-reaching. In the following I try to give some examples about fields that necessarily need those changes. First, changes of cultivation habits and methods are necessary to secure nutrition and its quality in the future for the growing global population. This may mean an introduction of more productive and disease-resistant GM plants and an introduction of totally new regions for cultivation. Second, production methods must become more effective than they are today. Third, food safety has to be improved, so that for example the origin of food is always known to consumers. Fourth, the food chain has to be shortened in most cases, and in that way fasten the flow of food to the consumers. Fifth, responsibility certificates and criteria must be introduced widely also at the international level, in the European Union as well as in the global food trade.

Sixth, company image and brand image should be built on the principles of sustainable development, and should be binding. The public sector must have a dominant role in controlling these in the future. Seventh, new products and product improvements promoting new consumption and production models must be launched as results of innovation processes. The same applies to new services and service concepts. Eighth, the business opportunities of national, or local, farmers and production plants functioning near to the origin of food must be strengthened. This provides regulation activities of the public sector, in order to challenge the power of global food conglomerates in food chains in domestic markets. Ninth, in the field of trade competition must be increased to make the position of consumers stronger. Tenth, new more effective logistical solutions must be developed.

V. A New Method for Characterizing and Steering Changes of Behaviour

Producing new practices provides often also interventions intended for changing existing and traditional models of behaviour. These are usually public sector interventions in order to affect an observed misbehavior. Especially in consumer behavior it is possible to steer people's courses of action into desired direction. For classifying and combining interventions with an analysis of desired behavior we need a proper method. Few published intervention evaluations refer to formal documentation describing the content and delivery of an intervention and are seldom reported by researchers or practitioners in enough detail to replicate them [21]. Thus, we are often left knowing very little about the details of an intervention or the functional relationship between the components of the intervention and outcomes [21].

Three researchers have constructed a method by which interventions were characterized reliably within the English Department of Health's 2010 tobacco control strategy and the National Institute of Health and Clinical Excellence's guidance on reducing obesity [22]. *The Behaviour Change Wheel (BCW)* is based on a comprehensive analysis of behaviour. With the help of it, we can find out the needed provisions for achieving the desired behaviour.

To achieve its goal, a framework for characterizing interventions should be *comprehensive*: it should apply to every intervention that has been or could be developed. Second, the framework needs to be *coherent* in that its categories are all exemplars of the same type of entity and have a broadly similar level of specificity. In addition, the categories should be able to be linked to specific behaviour change mechanisms that in turn can be linked to the model of behaviour [22].

The researchers have described a circle called the BCW, in the middle of which is *the behaviour system.* It includes three factors, which are conditions for an individual (or a consumer): *capability, motivation, and opportunity.* The researchers call these *the COM-B system* (Fig. I).

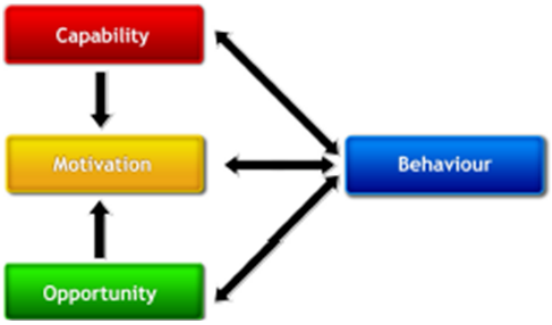

Fig. I. The COM-B system [22]

They constitute the core of the BCW. In this 'behaviour system', capability, opportunity, and motivation interact to generate behaviour that in turn influences these components.

Capability is defined as the individual's psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills. *Motivation* is defined as all those brain processes that energize and direct behaviour. They may be either habitual, emotional or analytical processes. *Opportunity* is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it [22]. A given interaction might change one or more components in the behaviour system.

Around the core in the Behaviour Change Wheel (Fig. II) are located *nine intervention functions,* which aim to improve behaviour by affecting one or more of the previous conditions. The functions are: education, persuasion, incentivisation, coercion, training, restriction, environmental restructuring, modeling, and enablement. Around the first circle of functions is another circle. On this circle are located *policies,* which make interventions possible. Policy options are respectively: communication/marketing, guidelines, fiscal measures (taxation), legislation (fines), service provision, and environmental/social planning.

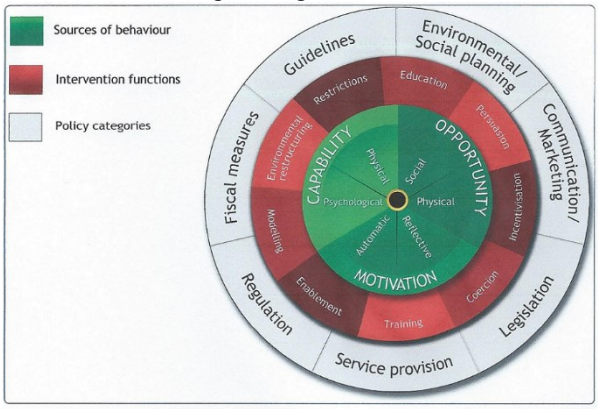

Fig. II. The Behaviour Change Wheel [22]

A systematic search of electronic databases and consultation with behaviour change experts were used to identify frameworks of behaviour change interventions. These were evaluated according to three criteria: comprehensiveness, coherence, and a clear link to an overarching model of behaviour. A new framework was

developed to meet these criteria. The reliability with which it could be applied was examined in two domains of behaviour change: tobacco control and obesity [22].

Nineteen frameworks were identified covering nine intervention functions and seven policy categories that could enable these interventions. None of the frameworks reviewed covered the full range of intervention functions or policies, and only a minority met the criteria of coherence or linkage to a model of behaviour. The BCW was used reliably to characterize interventions within the English Department of Health's 2010 tobacco control strategy and the National Institute of Health and Clinical Excellence's guidance on reducing obesity [22].

The researchers concluded that interventions and policies to change behaviour can be usefully characterized by means of a BCW comprising a 'behaviour system' at the hub, encircled by intervention functions and then by policy categories. According to them research is needed to establish how far the BCW can lead to more efficient design of effective interventions.

VI. Conclusion

The theory of behavioural economics has much to give for a better understanding of consumer behaviour and encouraging behaviour changes. These changes are needed to meet the global challenges ahead.

The BCW model described seems to apply quite well to designing and steering policies and interventions in private consumption decisions. It seems that policy options and intervention functions could be very similar in affecting food consumption decisions. Consumers are the ultimate decision-makers in food value chains. Long-term sustainable changes in consumer behaviour are therefore very important and extremely actual. However, consumption is only a part of the chain and consumers cannot solve the world's food problem alone.

Many big changes are needed along the whole food chain, as was shown. Systemic innovations are necessary for producing those changes and governing them in the best possible way. New innovations in food value chains from cultivation of food to consumers' tables should be strongly supported with government policies all over the world. Local production near to the origins of food and near to its consumers should be enhanced.

References

[1] M. Steger, *Globalization. A Very Short Introduction.* 3rd ed. Oxford: Oxford University Press, 2013, p.104.

[2] *The Economics Book*. London: Dorling Kindersley Limited, 2012, p.136.

[3] D. Kahneman, and A. Tversky , "Prospect Theory: an Analysis of Decision under Risk," in Econometrica, Vol. 47, No. 2, March 1979, pp. 263-292.

[4] R.H. Thaler, "Toward a Positive Theory of Consumer Choice," in Journal of Economic Behavior and Organization, Volume 1, Issue 1, March 1980, pp. 39-60.

[5] E. Dawnay, and H. Shah, *Behavioural economics: seven principles for policy-makers. Theoretical new economics 1.* London: NEF (New Economics Foundation), 2005.

[6] A. Bandura, *Social Learning Theory.* Englewood Cliffs, New Jersey: Prentice Hall, 1977.

[7] H. Tajfel, M. Billig, R. Bundy, and C. Flament "Social categorization and intergroup behaviour" in *European Journal of Social Psychology*, 1, 1971, pp. 149-177.

[8] H. Tajfel, and J. Turner, "The social identity theory of inter-group behavior" in S. Worchel and L. W. Austin (eds.) *Psychology of Intergroup Relations* (Chicago: Nelson-Hall, 1986.

[9] I. Ajzen, L.H. Rosenthal, and T.C. Brown, "Effects of Perceived Fairness on Willingness to Pay" in *Journal of Applied Social Psychology*, Vol. 30, Issue 12, 2000, pp. 2439-2450.

[10] B.S. Frey, M. Benz, and A. Stutzer, "Introducing Procedural Utility: Not only What, but also How Matters" in *Journal of Institutional and Theoretical Economics 160*, 2004: pp. 377-401.

[11] L. Festinger, *A Theory of Cognitive Dissonance.* Stanford: University of California Press, 1957.

[12] D. Pearce,"The Role of 'Property Rights' in Determining Economic Values for Environmental Costs and Benefits," Report to the Environment Agency, 2002. Available: http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.506.4709.

[13] R. Baldwin, "Globalisation: The Great Unbundling(s)." Helsinki: The Economic Council of Finland, Prime Minister's Office, 2006. Available: http://appli8.hec.fr/map/files/globalisationthegreatunbundling(s).pdf.

[14] Teagasc, 2017a. Available: http://www.teagasc.ie.

[15] D. Rotman, "Why We Will Need Genetically Modified Foods." in *MIT Technology Review*, Vol.117, No.1.Massachusetts Institute of Technology, 2014, pp.28-37.

[16] Teagasc 2017b. Teagasc Statement of Strategy 2017-2020: pp. 5, 12, 18-19. Available: https://www.teagasc.ie/media/website/publications/2017/Statement-of-Strategy-2017-2020.pdf.

[17] A. Rip, and R. Kemp, "Technological change." In S. Rayner, and E.L. Malone (eds.) *Human choice and climate change*, Columbus, Ohio: Battelle Press, 1998, pp. 327-399.

[18] F.W. Geels, and R. Kemp, "Dynamics in socio-technical systems. Typology of change processes and contrasting case studies." in *Technology in Society 29,* 2007, pp. 441-455.

[19] F.W. Geels, and J. Schot, "Typology of Sociotechnical Transition Pathways." in *Research Policy 36,* 2007, pp. 399-417.

[20] M. Nieminen, V. Valovirta, and A. Pelkonen, *Systeemiset innovaatiot ja sosiotekninen muutos (Systemic innovation and socio-technical change). Kirjallisuuskatsaus.* VTT Tiedotteita – Research Notes 2593, Helsinki: VTT, 2011.

[21] S. Michie, D. Fixsen, J.M. Grimshaw, and M.P. Eccles, "Specifying and reporting complex behaviour change interventions: the need for a scientific method," in *Implementation Science,* 2009, 4:40. Available: http://www.implemen tationscience.com/content/4/1/40.

[22] S. Michie, M. van Stralen, and R. West, "The behaviour change wheel: A new method for characterizing and designing behaviour change interventions.," in *Implementation Science* 2011, (6):42. Available: http://www.implementationscience.com/content/6/1/42.

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Reports 204, Turku 2014. ISBN 978-952-216-550-3. 45 pages (in Finnish). (2) Gaspareniene L. – Remeikiene R. – Heikkilä M., Evaluation of the impact of shadow economy determinants: Ukrainian case, Vilnius 2016. Available at ScienceDirect / Intellectual Economics, www.elsevier.com/locate/intele.
http://dx.doi.org/10.1016/jintele.2017.03.003.