AN INSTITUTIONAL ECONOMICS FRAMEWORK TO EXPLORE SUSTAINABLE PRODUCTION AND CONSUMPTION

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Abstract

Although policy actions are being taken by many governments around the world on sustainable development, the application of institutional economics to sustainable development is still in its infancy. In the literature, there are a wide range of institutional economics frameworks deployed to explore aspects of sustainable development, but the majority focus on common pool resources or social ecological systems, often with a high focus on extractive parts of the economy, not consumption and upstream provision choices that drive the extraction. The current paper presents an institutional economics framework to address sustainable production and consumption. The research draws on literature, experiential knowledge and theory to construct the framework. The resulting framework leads to an institutional economics understanding of embeddedness for exploring sustainable production and consumption; an extended and wider conceptualisation of value and resources in the light of sustainable production and consumption; An exploration of governance structures (markets and organisations) as value and values articulating institutions in the light of sustainable production and consumption. Less work is conducted at the level of institutional environment, but by exploring literature examples of changes advocated at this level by scholars, it becomes apparent that changes beyond property rights can be used to bring forth sustain- able production and consumption. The paper concludes by setting out that an institutional economics approach to sustainable consumption and production entails a 'cultural shift' towards more sustainable consumption; innovation in governance structures (for both markets and firms) towards sustainable pro- duction (and consumption); alongside changes in the institutional environment (including law) to create a selection environment where sustainable production and consumption can flourish.

1. Introduction

The scale of resource flows to provision goods and services is the main reason that society stands so close to breaching many boundaries set out for key global environmental pressures (Allwood et al.,

2011 ; Steffen et al., 2009). Sustainable production and consumption requires a combination of new technologies, changes in practice/behaviours, in combination with new business models. The institutional setting within which production and consumption occur can have a profound influence on the extent and speed of change in all of the three aspects. Therefore, there is potentially a strong role for institutional economics to inform the transition towards a more sustainable economy. A vein of literature that addresses the topic of sustainability and institutional economics can be identified as Ecological Institutional Economics. Paavola and Adger (2005) claim that institutional ecological economics has the greatest relative advantage in analysing the de-sign, implementation and effectiveness of environmental governance solutions. Most frameworks that current exist that address aspects of sustainable development (applying institutional eco- nomics perspectives) draw mainly on new institutional economics (NIE). Yet classical institutional economics understandings can pro- vide greater interdisciplinarity, wider conceptions of institutions and their interaction, as well as a greater focus and understanding of behaviour, informal institutions and their functioning relevant to sustainable production and consumption. This paper crafts and reconciles a framework making use of insights from both fields.

2. Literature review

A reorientation of institutions and governance is called for by the Brundtland Report (World Commission on Environment and Development, 1987) and quite a number of other reports on sustainable development. Early works on institutional economics and the environment includes but is not limited to: Kapp 1969 on the subject of social costs, Swaney (1987) who identifies the role of institutional economics in addressing environmental and sustainability challenges; Söderbaum (1990 and 1992) where an exploration of neoclassical approaches and institutional approaches to the environment are undertaken and (Costanza et al., 2001) on institutions, ecosystems, and sustainability. More recently, authors such as Arild Vatn, and others have provided fundamental insights in the field, publishing key works on the subject (Vatn, 2005, 2010, 2012, 2015a,b).

There are a wide range of institutional economics frameworks that can be deployed to explore aspects of sustainable development as outlined in review (Bradley, 2021). The majority of frame- works that exist however, focus on common pool resources or social ecological systems, most often with a high focus on those exploiting these systems (but not consumption and upstream provision choices that drive them economically). These frameworks are often highly applicable to resource extractive sectors, but few focus on sustainable consumption and production (Bradley, 2021). It is also notable that NIE frameworks (most prevalent) tend to pre- dominantly see institutions as rules (formal and informal). Classical institutional economics can provide a wider conception of institutions as well as a greater focus and understanding of informal institutions and behaviour which are particularly important in sustainable consumption and production, but these forms are most often neglected in most new institutional economics work (apart from social norms). The potential for a framework combining insights and understandings from the two fields was recognised in relation to addressing sustainable development in review (Bradley, 2021).

Realising this gap, the current paper attempts to bring together and reconcile a framework combining insights from both fields to help inform questions and analysis in the pursuit of an institutional economics of sustainable consumption and production. The main aim of the paper is therefore to craft an analytical frame- work to explore sustainable production and consumption. The re- search question is: Can a framework for institutional analysis of sustainable production and consumption be synthesised that builds on classical and new institutional economics?

3.1 Method

A systematic literature review of existing institutional economics frameworks focused on sustainabile development was undertaken, see Bradley 2021. In developing a conceptual framework, Maxwell (2005) identifies that scholars should not simply review and summarize some body of theoretical or empirical publications, for three reasons:

1. As this can lead to a narrow focus on the literature, ignoring other conceptual resources that may be of equal or greater importance for your project;
2. It tends to generate a strategy of "covering the field" rather than focusing specifically on those studies theories and studies that are particularly relevant to your research;
3. It can lead you to think that your task is simply descriptive.

They further state that the most productive conceptual frameworks are regularly those that bring in ideas from outside the traditionally defined field, or that integrate different approaches, lines of investigation, or theories that no one had previously connected.

The author emphasises that your conceptual framework is something that is constructed, not found, it incorporates pieces that are borrowed from elsewhere, but the structure, the overall coherence of the framework, is something that you build, not something that exists ready-made.

Therefore, in order to build the framework, the paper draws on experiential knowledge and existing theory and research, to build the conceptual framework. The use of experiential knowledge has gained wide theoretical and philosophical support in developing conceptual frameworks in recent times (see Berg & Smith, 1988; Denzin & Lincoln, 2000; Jansen & Peshkin, 1992 in Maxwell 2005). Experiential knowledge is one of the most important conceptual resources yet one that is most seriously neglected. The experiential knowledge approach makes use of a scientist's technical knowledge, research background and personal experience to inform and craft the framework in the required way (Maxwell 2005).

3.2 Approach in developing the framework

There are five requirements of the framework of this paper: A working definition of institutions and sustainable production and consumption; A model of consumer and employee behaviour; A common language; A structure for guiding different levels of social analysis and understanding interaction; and incorporating technology and physical environment explicitly into the framework.

Firstly, a working definition of institutions is set out and justified for the framework, the definition selected is right for sustainable production and consumption and can incorporate classical, as well as NIE understandings of institutions (a key aim of the framework). The model of consumer and employee behaviour that is required for the framework is then identified and justified, providing a coherent way to understand consumer (as well as civic) and employee behaviour. The model of consumer and employee behaviour applied, allows understandings from classical (i.e. socially embedded behaviour) as well as NIE perspectives (that apply bounded rationality).

In order to develop a structure for guiding different levels of social analysis of the institutional economics of sustainable production and consumption, the paper modifies and synthesise a broad structure set out in Williamson (2000). This allows us to understand the different levels at which institutions operate and interact for sustainable production and consumption.

Firstly, the paper synthesises coherent theory for a level of the framework that Williamson takes as given - level 1 embeddedness (Williamson 2000). This level is critical to exploring institutions in relation to sustainable production and consumption. In tandem with making this change, the paper requires the incorporation of a more extensive definition of institutions than provided by Williamson (2000). This wider definition of institutions is also required when looking at other levels for sustainable production and consumption. The wider definitions reside within the classical institutional economics. In this way the framework identifies and allows more in depth understanding of the range of relevant institutions and also the mechanisms and functioning of these institutions. Within this section (4.5), mechanisms and functioning of institutions from classical institutional economics are reconciled with empirical evidence on the situational and behavioural factors influencing human behaviour, aligning theory with science.

Resource throughput, allocation, employment and value creation are then looked at (Level 2). Value is defined and a wider conceptions of value (including instrumental value) are set in place. Critically, the environment as a stakeholder is established and recognised following Evans et al., (2017). The framework therefor incorporates a wider conceptualisation of value beyond just exchange value (money) and utility to individuals to address the broader scope and goals of sustainable development (environment, social and economic) and value for whom (individuals, organisations, society and the

environment). The section ends by setting out that economics and human induced preferences and value creation and capture must stay within ecological limits and physical constraints. The section argues identifies that mainstream environmental economics approaches are insufficient to ensure this. This is timely, given much debate of environmental economics approaches such as a new carbon tax in the UK (The Independent 2021) and an environmental economics approaches to biodiversity loss set out in Dasgupta 2021.

Using the wider conception of institutions (set out at level 1) and value (set out at level 2), the paper then moves on to look at level 3 (Governance), here the paper treats with the functioning of markets as governance structures (institutions) and in particular as value articulating institutions (using the broader conceptualisations of institutions and value set out at levels 1 and 2). The value that markets articulate and problems caused for sustainable production and consumption are explored. A second type of governance structure, organisations (as opposed to firms) are then looked at in terms of institutional functioning and value articulation. This ensures relevant considerations of the functioning of these as institutions and how sustainable production and consumption can be shaped at this level. The concept of business models is then looked at as a useful way to understand organisational governance structures for sustainable production and consumption. The section then explores institutional business models forms that shape sustainable production and consumption.

A look at the role of law in addressing sustainable production and consumption is then addressed at level 4 (Institutional Environment) as these shape the 'play of the game'; though it is acknowledged that analysis of play of the game (L3 analysis) is also required in response to the lack of a 'frictionless' institutional environment, as Williamson 2000 sets out. The focus of this section of the paper is on potential interventions that might help bring forth sustainable production and consumption. A review of potential interventions in Environmental law/Ecological law is undertaken to illustrate how changes in the institutional environment might tilt the selection environment of the economy towards sustainable development. The framework acknowledges that costs and efficiency of interventions are important and does foresee a strong role for institutional economists in evaluating different proposed changes in the institutional environment at this level. This said, the framework advocates that such interventions should be assessed on multiple criteria, not just purely economic.

4 Resulting framework

4.1 Defining institutions and sustainable production and consumption

Many authors define institutions in somewhat different ways. The definition applied in the current framework is from the classical institutional economics school by Dequech (2002). Dequech (2002) identifies institutions as being partly seen as constraints, as cognitive models, or as normative structures.

We ap- ply this definition, but later in the paper replace normative structure and cognitive models with a broader definition of 'modes of thinking, feeling and action' proposed by Kapp et al. (2011). This works well for the current paper and allows a definition of institutions that has traction and can span the different levels of social analysis that are covered. The framework currently defines sustain- able production and consumption as follows: "*Sustainable production and consumption can be defined as production and use of products and services in a manner that is socially beneficial, economically viable and environmentally benign over their whole life cycle*". (Azapagic, 2020).

4.2 The model of consumer behaviour (relevant to sustainable consumption)

When developing a framework to investigate the institutional economics of sustainable consumption and production, there is a need to situate where one stands in terms of economic theory and a model of consumer behaviour. The current framework follows the line of NIE and rejects the assumption that consumers are rational. Bounded rationality is a more suitable model of consumer behaviour, and applied for the current framework. The framework however, follows Vatn (2005) and apply the approach of integrating the individual model into the wider perspective of social construction. This gives a more realistic, fluid and broader understanding that what is rational or the logic that prevails for individuals, has a context and institutional dependence, the focus is not only the individual but also the given context (e.g. the community) that informs their thinking, feeling and action. The definition and approach is coherent and aligned with empirical evidence on factors determining human behaviour. A little more detail on the integration of the individualistic model into the wider perspective of social construction discussed in Vatn (2005) is now provided.

"*The core assumptions of neoclassical economics are rational choice as maximisation, stable preferences and equilibrium states (Becker, 1976 and Eggertsson, 1990). Rationality is understood in individualistic terms. It demands that preferences are complete, transitive and continuous (Hausmann, 1992). Furthermore, to be termed rational, choices must be in accordance with what is preferred the most by the individual. As a logical consequence of the strong version of methodological individualism*[2] *that underpins this model, preferences are treated as stable or at least as given."* Vatn (2005, page 204)

NIE applies broadly the same model of consumer behaviour as the neo-classical paradigm, but importantly, rejects assumptions of rationality as mentioned, accepting that actors have limited cognitive ability and lack full information, it also rejects the assumption of zero transaction costs, therefore coming closer to reality (Vatn, 2005).

For the social constructivist perspective, (sociology and classical institutional economics) behaviour is dominantly understood as socially created, implying that choices reflect, rules, norms and expectations built into the institutions of a society. As seen in Vatn (2005, p.206) he identifies the origin of these

perspectives as coming from: *"Rousseau (1762/1968), later to the sociologist Emile Durkheim (e.g, Durkheim, 1893 and Durkheim, 1895) and the founder of 'classical' institutional economics Thorstein Veblen (e.g. Veblen, 1898 and Veblen, 1899).* Within modern sociology, two main traditions exist: the cognitive and the normative (Vatn 2005).

Vatn (2005) cites Berger and Luckman (1967) as being basic to the cognitive position. With regards to cognitive models/structures, a core example is given as the development of language. It is stated that the development of cognitive takes the form of a dialectical process:

"*There are three phases in this dialectic process. First, we have externalization, implying that subjectively constructed typifications like a 'meal' or a 'measurement scale' are expressed; next we have objectivation where these typifications retain existence independent of those creating them and stand out as facts or 'things'; finally, there is internalization, the phase in which these social constructs are taken up and reproduced by others. Through objectification and social constructs take on a form of 'naturality'. They become given and hard to observe as socially constructed. For those growing up, they are just there. According to Berger and Luckmann it is the sharing of the classification, the common acceptance of a typification, which makes it an institution."* (Vatn 2005, p.207)

Vatn (2005) identifies this as a very different understanding of institutions as compared to that of NIE, but one that is emphasized by classical institutional economists. Also, they are important in creating the individual and provide necessary meaning to actions that one undertakes, Social identity is produced thereby (Vatn cites Scott 1995).

Vatn (2005) explains that the normative perspective shares the idea of symbolic interaction, but has a stronger emphasis on creating common values and pressures faced by individuals in fulfilling certain obligations and expectations. Vatn cites March and Olsen (1989) as representing a relatively recent version of the position: "*behaviour is contained or dictated by cultural dicta and social norms. Action is often based more on identifying the normatively appropriate behaviour than on calculating the return expected from alternative choices*" (March and Olsen, 1989:22). Rationality is to do what is appropriate. The perspective taken and illustrated by Vatn and his synthesis is that the logic of the situation is institutionally formed.

The major points that Vatn's paper brings out, is the role of institutional factors in: the process of preference formation; and the logic/ rationality that is applied; and the recognition that one can integrate the individualistic model into the wider perspective of social constructivism. The latter points are critical to the current paper and framework due to recognising the importance of understanding how institutions (in their various forms) shape both consumption and production choices, but also because

it allows a framework (that has a model of consumer behaviour at its heart) that can span NIE and disciplines with a stronger behavioural insight (for example classic institutional economics). It also allows the framework to accommodate a dynamic understanding of consumption, production and context, which is key in ultimately determining the types and forms of value (and dis-value) created within an economy (see discussions of value and dis-value and the importance of context in Bradley et al 2020). The model of consumer behaviour chosen allows integrated, interdisciplinary understandings to be incorporated into the framework and in application.

4.3 The model of employee behaviour

Principal-agent theory within NIE, assumes agents within firms will shirk unless their actions contribute directly to their own economic self-interest and that only via monitoring and contracts (extrinsic motivation) that appeal to their self-seeking nature that shirking will be avoided (Simon 1995). Such logic stems from assumptions that actors are selfish and rational. In relation to employees, Simon (1995) stresses a range of motivations that employees have, not just maximising utility, and he puts forward that motivation primarily needs to be looked at the employee level as most producers of firms are employees not owners. At this point, it is useful to connect with evidence on employee motivation. Sameh (2010) conducted an extensive review of the empirical evidence and theory on employee motivation and identified the three most comprehensive theories in relation to employees and motivation and relationships between them as seen in Figure 1.

Type of motivation	Herzberg's Categories		Maslow's Categories	Alderfer's E-R-Categories
	Work itself	} motivators	Self -actualisation	
	Achievement	} motivators		Growth
Intrinsic	Possibility of growth	} motivators		
↑	Responsibility	} motivators	Esteem-self-confirmed	
	Advancement	} motivators	----------	
	Recognition	} motivators	Esteem-interpersonal	Relatedenss
	Status	} Hygiene	Social needs	
	Relation with superv	} Hygiene		
	Peer relations	} Hygiene		
	Relations with subor	} Hygiene		
	Company policies	} Hygiene	Safety-interpersonal	
↓			----------	
	Job security	} Hygiene		
Extrinsic	Working conditions	} Hygiene	Safety material	Existance
	Pay	} Hygiene		

Figure 1: Relationships among content motivation theories (Adopted from Schneider and Alderfer (1973) and Luthans (1995).

It can be seen on the left side the differentiation of extrinsic versus intrinsic motivation. It is clear that in the context of employees, certain needs have extrinsic motivations (such as pay, job security and status as seen in Figure 1) and others have intrinsic motivation (such as advancement and achievement and self-growth). Intrinsic motivation is defined as the doing of an activity for its inherent satisfaction rather than for some separable consequence or external reward. Intrinsic motivations can often be more motivating than extrinsic incentives (Ryan and Deci 2000 and Pink 2009), the evidence also shows that in some contexts, extrinsic incentives can reduce intrinsic motivation (but not all). Intrinsic motivation is often still self-regarding behaviour. Psychologists have shown however, that people most often have both self-regarding behaviours and other regarding behaviours and that there can be a tension between them, yet both are vital to survival (See Schwartz 2006 and Schwartz 1999) and can be more or less drawn out dependent on context. Mainstream economics is largely taught with the assumption that individuals are selfish and utility maximising, and firms are assumed to be profit maximising, as the main objective (see Bradley 2019). With regards to employees as Simon (1995) points out, there are often assumptions that agents within firms will shirk unless their actions contribute directly to their own economic self-interest (aligned with mainstream theory). Do such assumptions (formal institutions in themselves) leave space for the other regarding sustainable consumer or a pro-environmental employee who certainly exist? Quite a number of UK economists do not believe that such mainstream assumptions are helpful in addressing sustainable development (Bradley 2019). Given the quite substantial disruption to consumption patterns needed to achieve a sustainable economy (sometimes with limited self-benefit), it can be argued that we need economic systems and interventions that draw out the other regarding behaviours, see also Jackson 2009. Taking account of the above, the current paper aligns with Paavola and Adger (2005) that assumptions of maximising utility should be rejected and instead replaced with the assumption of a plurality of motivations. Paavola and Adger (2005) advocate recognising intra and inter personal pluralism and in this way define their confidence in the use of motivational pluralism in economic analysis of the environment and sustainability, and as outlined above, there is strong evidence to support this. This can also align with bounded rationality being context specific and socially embedded and is consistent with the model of consumer behaviour applied in the framework. Plurality of motivations can apply to both consumers, employees and potentially entrepreneurs (social entrepreneurs, community business leaders etc).

Paavola and Adger (2005, p.359) define intra and inter personal pluralism as follows:

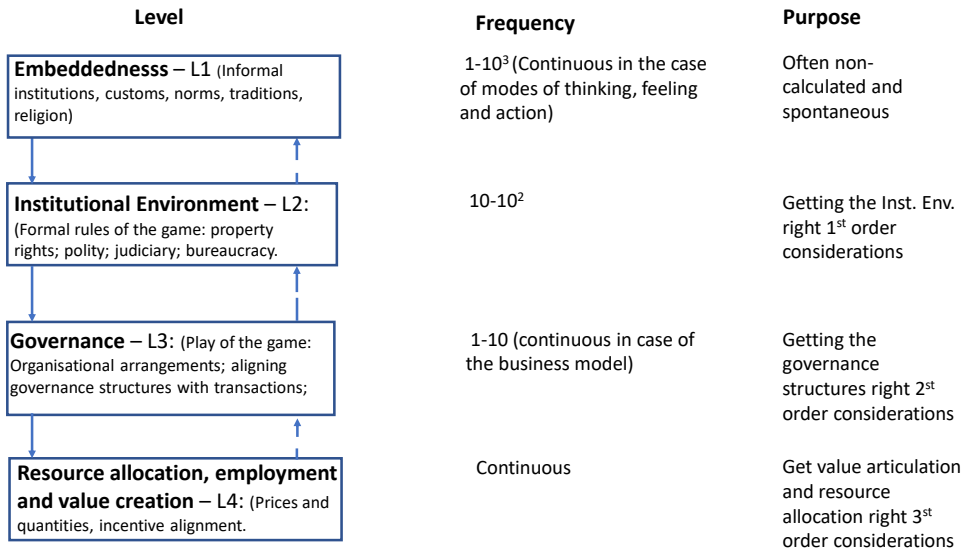
"intrapersonal pluralism means that agents may hold multiple values and have to decide which values are to inform their preferences in a choice situation." "Interpersonal pluralism means that agents may

be informed by different values in the same choice situation, and arrive at either the same or different choices."

Intrinsic motivation is often associated with alignment of values, doing something because you want to and see it as important (value it) as opposed to conducting the activity to receive an extrinsic reward. Besley and Ghatak (2016) show that in the long-run economies that rely on intrinsic motivation or extrinsic incentives will have similar levels of average productivity but the former will have higher welfare levels. Although effectiveness of intrinsic versus extrinsic motivation, depends on tasks and by sector (Pink 2009).

4.4 The structure for guiding different levels of social analysis and understanding interaction in relation to consumption, production and a sustainable economy

In this section the broad framework is set out, the paper starts by employing a frame (or shell) from Williamson (2000). The current framework is however different to Williamson's, as his framework was focused on economic development, not sustainable development and sustainable production and consumption.



L1 – Social theory; L2 – Economics of property rights, positive political theory; L3 - transaction cost economics; L4 – Neoclassical economics/agency theory

Figure 2: Original framework of Williamson 2000

The field of NIE has principally been concerned with levels 2 and 3 of the Williamson (2000) framework in Figure 2, primarily through transaction cost economics analysis and analysis of alternative property rights regimes. Williamson identifies level 1 as taken as given by most institutional economists. For the institutional economics of sustainable production and consumption, level 1 is extremely important and strong consideration is required in order to understand the range of institutional

forms and mechanisms through which level 1 institutions may drive and encourage or dis-courage particular forms of consumption and production (and how level 1 institutions are shaped and crafted by higher levels and indeed do themselves shape and craft outcomes at other levels). Classical institutional economists such as Veblen and Ayres also showed how informal institutions at this level can speed up or slow down technological progress. Due to this prominence, the order of the framework is modified, level 1 remains as Embeddedness, however L2 is now resource allocation and employment and therefore much closer to embeddedness, as the evidence shows that embeddedness plays a huge role in determining resulting consumption (and also production) decisions and resulting value (at L2). Level 3 remains as governance and L4 is now institutional environment as it substantially shapes what is possible at all other levels. It should however, be acknowledges that analysis of governance (L3) structures often becomes important because of the prevailing set of rules and laws at L4 (as in Williamson 2000). This said the whole system is interconnected.

As with Williamson, solid arrows identify that a higher level imposes constraints on the level to which the arrow is going, dashed arrows however signal feedback. Williamson (2000) states that in the fullness of time, the system is fully interconnected, but states that he mainly neglects the feedbacks. When looking at the institutional economics of sustainable production and consumption, feedbacks can be important (even in short time spans e.g. 1-2 years) therefore they are made explicit in this paper, particularly between L1 and L2, and L3 and L4. Considering the level of Embeddedness as the revised framework does, means that some of the original focus and questions of classical institutional economics are now again highly relevant in an environmentally constrained era/paradigm of sustainable production and consumption. Questions such as:

"*what are the concrete needs and wants of human beings?" and "what are the specific, proximate reasons for human conduct, effort, and expenditure*?" (Kapp et al 2011).

In Williamson (2000) there is no direct specification of the role of technology in shaping and interacting with institutions (surprising given that technology was a key focus in the earlier classical school). Technology can play a central role in shaping institutions within economies and societies (particularly at levels L1, L2 and L3) and in sustainable consumption and production, therefore it's role must be formally and explicitly identified, so this is implemented in Figure 3. Classical institutionalists were very concerned with the role of technology in ensuring longer term instrumental value; although the current framework argues that some gave too prominent a role to technology in ensuring this. The onset of digitalisation, renewable technologies etc. in ensuring sustainable and un-sustainability of economic systems means technology must be explicit in the framework. A more prominent role for technology, aligns with classical institutional economics and there focus on the importance of scientific knowledge informing the economy. A second important aspect not made explicit in Williamson (2000) is the role

of physical environment and infrastructure (Defra 2008) in shaping institutions and their prevalence, therefore this is also explicit.

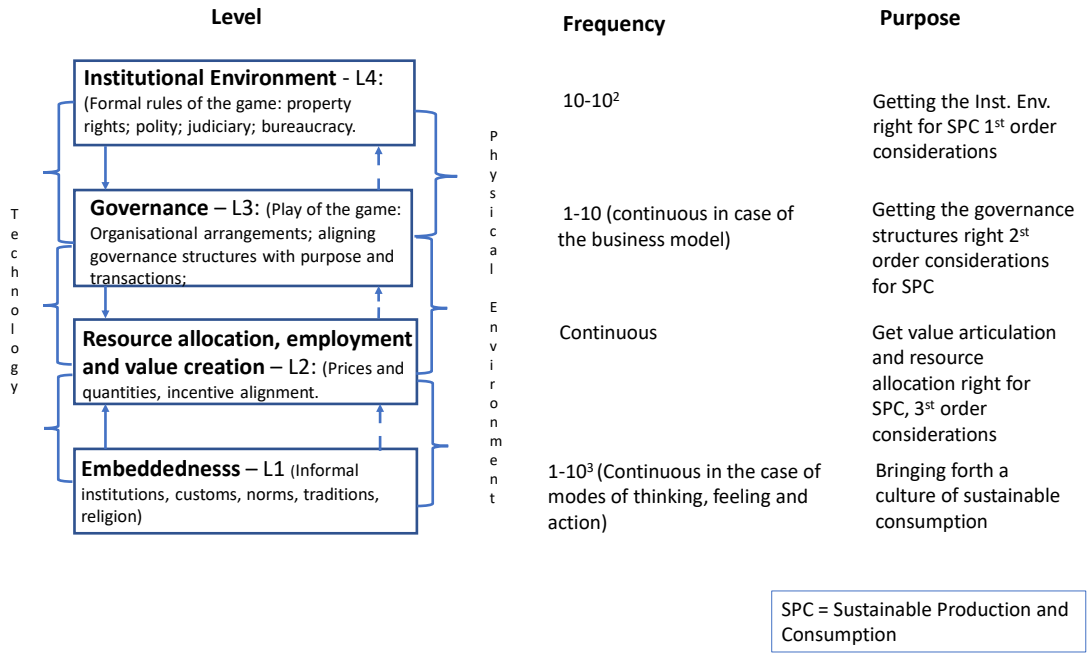


Figure 3: A revised framework for the institutional economics of Sustainable Production and Consumption (SPC)

4.5.1 Embeddedness

In Williamson, it is stated that Level 1 (embeddedness) consists of the following: informal institutions, customs, traditions, norms and religion etc. This section of the paper starts by defining embeddedness and looking at the different but inter-related forms that it can take. In relation to embeddedness, the perspective that that has dominated recently is within in Economic Sociology, Granovetter's theory of embeddedness, his most important work on embeddedness was published in 1985 (Smelser and Swedberg 2005), the notion can however be dated back to Karl Polanyi and Clifford Geertz (Dequech 2003). The definition of embeddedness provided by Granovetter states that economic actions are "*embedded in concrete, ongoing systems of social relations*" (Granovetter 1985, 487). According to Granaovetter, an important distinction needs to be drawn between an actor's immediate connections (e.g. direct social encounters) and more distant ones (indirect social encounters), termed "*relational embeddedness*" and "*structural embeddedness*" (1990, 98-100; 1992, 34-37, as seen in Smelser and Swedberg 2005). Granovetter applied the term "structural embeddedness" to indicate that not only the personal relations (the "*relational embeddedness*") are important, but also "*the structure of the overall network of relations*" (Granovetter 1990, as seen in Dequech 2003).

Granovetter's argument on embeddedness has been debated and criticised widely. Several scholars have identified that Granovetter omits considerations of many aspects of economic action, including a link to the macroeconomic level, culture and politics (Smelser and Swedberg 2005). Out of this further consideration important work was published by Zukin and DiMaggio (1990), where they identify wider forms of embeddedness of economic action: cognitive, cultural, structural and political. The four different forms are now summarised: cognitive embeddedness (the ways in which structured regularities of mental processes limit the excise of economic reasoning (e.g. bounded rationality), cultural embeddedness (the role of shared collective understandings in shaping economic strategies and goals), structural embeddedness (contextualisation of economic exchange in patterns of ongoing interpersonal relations) and political embeddedness (the manner in which economic institutions and decisions are shaped by a struggle for power that involves economic actors and non-market institutions). Focusing on cultural embeddedness for now; following Hofstede (1991;4), culture gives rise to patterns of thinking, feeling and action (mental programmes or the 'software of the mind' as seen in Scott 2013), this is how institutions are defined at level 1 in this paper (earlier defined as modes of thinking, feeling and action).

Culture can be separated into two forms: constitutive forms of culture (e.g. categories and scripts) and regulatory ones e.g. values and norms (Di Maggio 1994). A leading institutional economist, David Dequech states that these distinctions seem to partially overlap and are not mutually exclusive (Dequech 2003). Dequech then identifies that this resonates with his own taxonomy of how institutions influence economic behaviour, which draws on the work of several institutional economists - the restrictive function of institutions (acting as constraints); Cognitive function of institutions, this being the informational-cognitive function (the information that institutions provide to the individual) and the deeper cognitive functions of institutions (their influence on people's perceptions of reality); Third the valuative function (valuative aspect of culture, identifying culture as providing values and perception of what is of value). In his paper, Dequech (2003) then introduces a fourth function, the emotional function, said to relate to the expressive, or affective, aspect of culture. Dequech (2002) seems to see institutions predominantly as either constraints, as cognitive models, or as normative structures. In the 2003 paper, however, he seems to pick up on an emotional link with his forth categorisation of the functioning of institutions, by adding the emotional function. This moves close to classical institutional economist definition of institutions (by Kapp et al 2011), they are said to think of institutions in terms of Mill's reference to "modes of thinking, feeling and action". They think of them in a behavioural sense. Kapp et al (2011) points out that:

"defining institutions as patterns of behaviour is, of course, compatible with the popular identification as stabilised social arrangements and organisations. For it stands to reason that "habits of thought, feeling and action" will find a counterpart in social arrangements of a more or less formal character. Such arrangements, in turn, stabilize the habitual pattern of thought and behaviour. Therefore, there

is no harm in referring to these social arrangements and organisations as institutions, providing it is understood that what is really under discussion are patterns of behaviour and not organizational charts or legal arrangements. Institutional economists consider these habitual patterns of thought and action to be of central importance in explaining and interpreting economic processes and development."

The framework of this paper recognises that both are important, therefore both should be addressed in the framework and emphasised: institutions as patterns of behaviour and institutions as stabilised social arrangements and organisations. Critically, the framework of this paper allows us to link between these different forms of institutions and therefore enlighten on their interaction and influence in relation to production and consumption. The definitional relation between institutions and culture according to classical institutional economics is shown in Kapp et al (2011) who define culture as:

"the sum total of a complex of institutions and interrelated habitual models of thinking, acting, and feeling (including the corresponding valuations, norms, and interpretations of the world of a particular epoch)-thus comprises the man-made learned and transmitted adaptive tools which form the prerequisites of human life and survival. In order to survive and exist, each individual must learn and master the system of institutionalized behaviour patterns that his group or society transmits to him in the process of enculturation"

4.5.2 Reconciling the mechanisms and functioning of institutions and framework structure with situational and behavioural factors influencing human behaviour;

Before outlining the remainder of the framework, it is useful and informative to reconcile the framework with the evidence on the range of situational and behavioural factors that influence human behaviour. Doing this positions the institutional economics approach with an empirical informed review of evidence on consumer behaviour and behavioural change (Jackson 2005, used to inform Defra 2011).

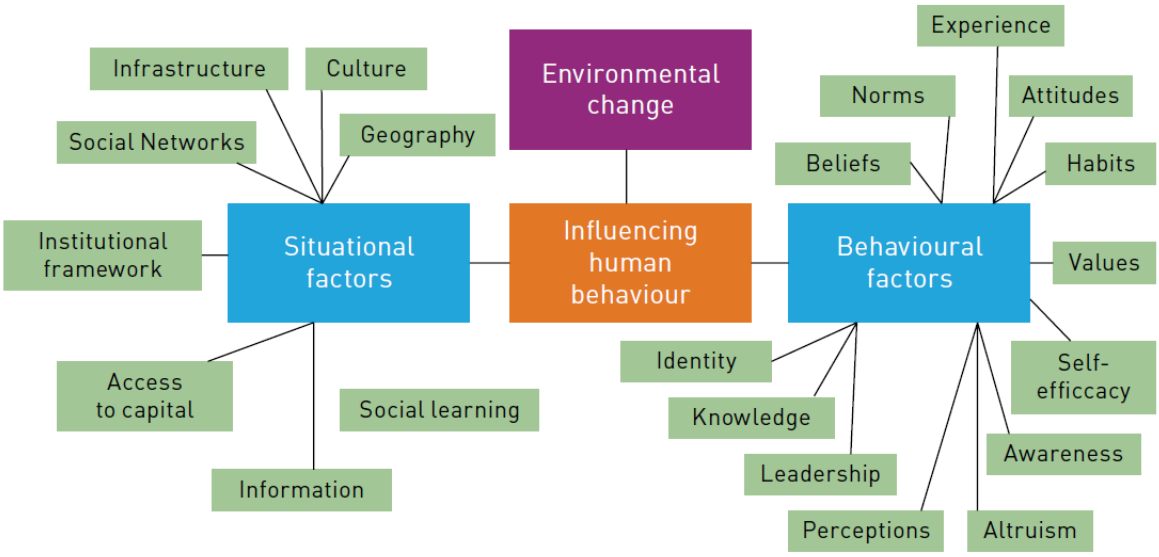


Figure 4: Situational and behavioural factors influencing human behaviour (Defra 2011)

Starting with the situational factors on left side of Figure 4 culture results predominantly from embeddedness (L1). Infrastructure, geography, and environmental change relate to physical environment of Figure 3, social networks result from structural and relational embeddedness in which one exists (L1), Institutional framework is the result of outcomes of levels 1, 3 and 4 (embeddedness, governance and institutional environment), access to capital is directly influenced by outcomes at Level 2 (Resource allocation, employment and value creation). Information results from all four levels of the framework and is shaped by the technology and physical environment of the time. Social learning is influenced by (L1, and in particular the structural and relational embeddedness) the context that an individual finds themselves in, but also by the governance structures and institutional environment (L3 & L4), that can shape what is learnt and for how long and by whom.

The following factors on the right side of Figure 4: Beliefs, norms, perceptions, attitudes, habits, values, altruism, and identity, when viewed collectively, can be seen as modes of thinking, feeling and action (of individuals and across groups) and therefore institutions in a behavioural sense, though it must be acknowledged that some, such as values have more personal influence, than do social norms. These behavioural institutions can be shaped and stabilised by the formal social arrangements and organisations (formal institutions at levels 1, 3 and 4 of the frameworks, e.g. pro-environmental values and norms with time may be reflected and re-enforced with formal organisations and law etc.) and by situational and behavioural factors: culture, social networks, information, social learning, self-efficacy, leadership, knowledge, and awareness that arise at level 1.

Institutions in a behavioural sense in Figure 4 (beliefs, norms, attitudes, habits, values, altruism, perceptions, and identity) can be discussed in terms of how they influence behaviour, by linking back with Dequech (2003). For example, perceptions, beliefs; attitudes; habits, values, and identity can have

an informational-cognitive function; a deeper cognitive function; a valuative function and an emotional function. Norms (and values) can also have an additional restrictive function. In these ways, these institutions (in a behavioural sense) can influence behavioural outcomes and decisions in the economy (influencing economic and physical material flows at L2).

Focusing on the level of the framework just outlined in the last section. Essentially embeddedness at level 1 substantially determines the "modes of thinking, feeling, and action" that emerge in society, through the perceptions, identity, attitudes, norms, habits, beliefs, awareness, values and valuations that emerge. Institutions in the non-behavioural form at Level 1 (formal tradition, religion etc.) also shape the behavioural institutions that emerge. Together, these institutions can substantially shape consumption choices, Gross Domestic Product (GDP) by sector (and incomes) and material flows and subsequent dis-value occurring from economic action at any given time. This brings us on to (Level 2) where outcomes from consumer decisions at L1 manifest throughout the economy and environment in terms of: resource throughput, allocation, employment and value creation.

4.6 Resource throughput, allocation, employment and value creation (Level 2)

As identified in the opening sentence of the introduction of the paper, it is the scale of material flows through society that is driving key global environmental pressures, so staying within environmental constraints, is intricately related to resource allocation and management of the economy and this must be recognised.

Level 2 is where resource allocation and employment and value creation occur. Firstly, value has to be perceived by the consumer. This requires them to perceive either use or non-use value from the good or service. Use value refers to "*the specific quality of a new job, task, product or service as perceived by users in relation to their needs (and context)"* (Lepak and Smith 2007 p.182). Following Plottu and Plottu (2007), this can be extended to value reflecting the satisfaction that the individual derives from using the resource. Use value also includes option value (Weisbroad 1964), that is the value of conservation of an element in view of its possible future use. Following Krutilla (1967), there are two main types of non-use value: existence and bequest value. For the former, this is value that individuals perceive due to the existence of items or environmental assets that individuals enjoy. Bequest value is the belief that future generations will inherit an item or environmental asset of value to them. It should also be noted that value is co-created (Chandler and Vargo, 2011) and that value creation (use and non-use value) and value capture (monetary value exchanged of use/non-use value) occur within a situated context, and is hence shaped by the system around it e.g. environment, culture, markets and market conditions etc. (Vargo and Lusch, 2008; O'Cass and Ngo, 2011; Ng et al. 2013).

Perceiving such value (at a given time) depends however, on knowledge; cognitive capabilities and the modes of thinking, feeling and action of individuals at a given time (in part shaped by institutions at level 1) and wider context. Once value is perceived consumers either choose to purchase or reject a good or service. This decision then translates into the goods being made or not made in the economy, ultimately driving production decisions (and intermediate consumption and resource extraction) in servicing the production of the good or service. Exchanges result: 1. exchange of money (exchange value) for the producer; 2. the receipt of the physical good or services (which have use and non-use value) for the consumer, provisioned by supply chains that service demand. Exchange value is defined as: "*either the monetary amount realised at a certain point in time, when the exchange of the new task, good, service, or product takes place, or the amount paid by the user to the seller for the use value of the focal task, job, product, or service*" (Lepak and Smith 2007 p.182). It should be noted that the translation of such perceived use and non-use value into exchange value form (which is registered in the economy and government economic accounts) requires the consumer to be willing and able to perceive such value; yet we know that consumers are not rational and have limited cognitive capabilities and information. Exchange value translation, also requires consumers to be able to pay for a good or service that provides value to them (depends on availability of markets as well as level of income). So, willingness to pay is not necessarily a good measure of need or a good measure value.

These exchanges discussed above, determine consumption and drive upstream production and ultimately the allocation of resources (exchange value) in the economy, each having associated physical resource extraction requirements and pollution characteristics (dependant on which products and services get made and the production method and technology of the time). The financial resource allocation (allocation of exchange value) is displayed below in the diagram of the circular flow of income. This provides a basic depiction of how economies function.

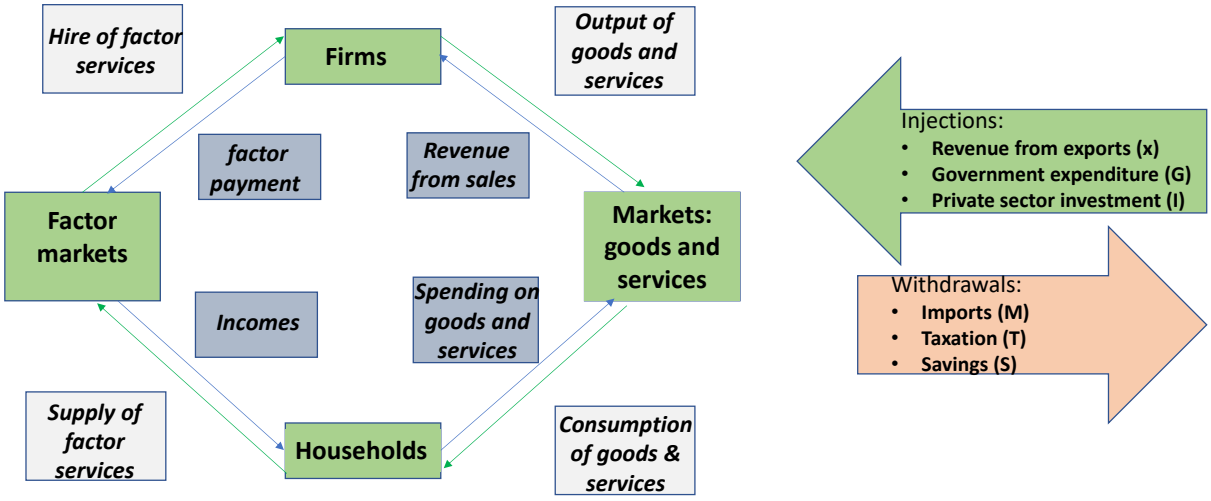


Figure 5: The circular flow of income (Mulhearne and Vane 2012)

GDP is the value of all of the final goods and services produced (across all sectors) in a year. GDP measures the value of production (estimated by taking revenue and subtracting purchased inputs and then adjusting for taxes and subsidies), which also is equivalent to total expenditure on final goods and total income for a given year.

Across many governments throughout the world and within mainstream economics, there is currently generally very little focus on the types of goods and services that should make up GPD, only a focus on being as close as possible to potential GDP and full employment as possible. Given environmental constraints, preference cannot be taken as given by economists (others concur with this conclusion for other reasons, see Hodgson 2010 for example). Economists urgently need to review this assumption of mainstream economics, and design and encourage economic selection environments that encourage consumption choices and patterns that benefit individuals and organisations but also avoid substantial dis-value to society and the environment (now and in the future).

Latest scientific evidence makes clear that shifts in lifestyles and consumption patterns (and a move away from focusing purely on GDP growth) are absolutely necessary to ensure society stays within environmental limits (Jackson 2009; Weidmann et al 2020). This wider view, remit and focus in economics must replace the narrow and blinkered approach that takes preferences as given, focusing on GDP and circular flow of income outlined above (taught in business schools throughout the world). Ensuring consumption and production choices that benefit individuals and organisations but avoid dis-value to society and the environment will entail substantial restructuring of economies. The response however, requires a realistic, evidence informed approach, without a reliance on outdated assumptions about human behaviour (that include rationality and selfishness as discussed above but also later) that lead many economics to conclude that the solutions to the environmental problem is simply to price externalities into the market and let consumers and businesses rationally respond and change their behaviour in their own self-interest, and individually in response to financial incentives.

There are a number of reasons why taking such an approach, on its own is not sensible; Firstly, if just focused on self-interest many businesses and consumers will simply not bother to engage due to inertia, habit; perceptions of reused products etc. particularly if not a major cost, not their core business, or of interest for them (there is evidence of this when looking at for example why many small medium sized businesses often do not engage extensively with resource efficiency, see AEA and SDRN 2009 as example). Second, using extrinsic economic incentives can erodes intrinsic motivation in some contexts (See Pink 2009). Also, a focus on self-interest, leaves other regarding behaviours un-encouraged and unharnessed in the move to a sustainable economy (yet we know these are important, see Jackson 2009). Third; In some situations, price changes can bring about a level of change in consumer behaviour through self-interest, but there are many situations where such approaches do not have strong effect

(key sectors such as energy for example) due to low price elasticity of demand. Fourth, too heavy a reliance on prices and taxes as an approach to shifting consumption patterns will disproportionally hit certain groups and has potential to increase inequalities. Much of this mainstream economics approach assumes agents are rational (which often they are not) and have full information and understand interactions and complexities in the system (which in most cases they do not). Issues of complexity and the economy are explored in Valentinov (2013) and the literature they build on. They identify the environmental problem, as many others have, as a systems problem, Ventinov 2013 notes:

"*Even a brief reflection will reveal that insensitivity to environmental feedback presents the essence of the institutionalist concerns about the poorly functioning embeddedness of the market into the broader societal and natural environment. The institutionalist position is that, while the market is so embedded, it tends to ignore the feedback generated by the encompassing environment. (p.680)*

Following Ventinov 2013, businesses often function as complexity simplifying devices for consumers but, in going about their business, wider interactions with society can either go un-noticed or un-regarded, particularly in a culture where maximising profit is often seen as the most important objective of firms.

To varying degrees, classical institutional economist can be described as systems thinkers. Many classical institutionalists have been influenced by John Dewey's instrumental view, institutional economics has a key focus on instrumental value (Rutherford 2004). Veblen's works and much institutional work identify that the pecuniary economic system fails to attain what they identify as instrumental value (discussed in Valentinov 2013). Instrumental value can be defined: the "generic ends of life" (cf. Sheehan and Tilman 1992, 200), or *"usefulness as seen from the point of view of generically human"* (Veblen [1899] 1994, 61). In institutional work, too much focus on ceremonial and pecuniary value, is seen as lagging progress towards longer term instrumental value. Classical institutional economists have varied in their perspective on technology and the faith they put in it, to improve the human condition, quite a number of institutionalists however, like Ayres saw technological progress as key to achieving instrumental value. Classical institutional economists such as Ayres investigated the interaction between technology and institutions (particularly informal) and how common perceptions, norms and various forms of informal institutions may hold back technological progress and the attainment of instrumental value. Technology is important, but it can be argued that classical institutional economists such as Ayres had too much faith in technology in social provisioning, and almost a blind faith in the improvement of the human condition via technological progress (see Rutherford, p.140). Many environmental problems have been caused by too much faith in technological progress alone to solve human problems, alongside a lack of systems thinking and a precautionary approach (see Carson 1962 with the example of Pesticides). The definition of instrumental value

focuses on human ends, the environment as a stakeholder is missing. Evans et al. (2017) identify society and the environment (not just humans) as primary stakeholders for sustainability. Additionally, it may be unwise to refer to longer-term value in terms of ensuring ongoing *life process of mankind*. Such definitions have in the past lead to thinking that can be unethical, and if you only want evidence of this, then see evidence in Cooley 1915, p.14-19.

Sustainable Economies need to have goals (and deign) that better account for current and future value to society but also for the environment; but not purely through a pricing and taxation approach for the reasons identified above. The current framework argues that there is a need for economic systems to factor in a wider set of 'goodness' both short and longer-term value (some of which will be instrumental value but some not) and to avoid dis-value for society and environment, often not be perceived by consumers. The concern of the current paper is that this is unlikely to be achievable through solely an environmental economics approach focusing on exchange value valuation, taxation and pricing etc. The current paper argues for an institutional economics approach as more appropriate. This paper defines dis-value to society as damage to humans' 'capabilities to flourish'; dis-value to the environment is defined as: 'damage inflicted on the environment and earths systems contributing to transgressing ecological limits and jeopardising integrity of ecological systems' (See Bradley et al 2020).

The current framework puts forward that a sustainable economy should be economically viable, provide high levels of wellbeing for its citizens and communities (partially through reducing inequalities), and avoiding dis-value to society and the environment. In relation to physical material throughputs and pollutants, the current framework draws on ecological economics and aligns with the following principles (Daly 2007):

1. That renewable resources should not be used at a faster rate than at which they can regenerate.
2. Sustainable use of non-renewable resources means that non-renewables: benefits should be split between Y (current income) and I (investment) such that a renewable substitute is available at depletion
3. Pollution: waste discharges below assimilative capacity – cumulative pollutants set at zero (or as close as possible);
4. Macroeconomic controls: minimise matter/energy throughput in the economy in meeting needs, and account for population growth.

Given that our current economies miss much value and dis-value that can be generated by economies in the processes of production and consumption. There is a need for more sustainable economies that factors these in better. There is a need for changes in incentives, but also for other forms of encouragement and constraint to move towards a sustainable economy. The current framework argues

for the need to address the culture and goals in society and business (L1 and L3), at the same time as ensuring changes in the institutional environment (L4) that bring forth strong sustainability, a precautionary approach and selection environment for sustainable economy.

4.7 Governance

Williamson 2000, building on work by Commons states, "*Governance is an effort to craft order, thereby to mitigate conflict and realize mutual gains. So, conceived, a governance structure obviously reshapes incentives*" (p.599 line 3). Formal institutions at this level include markets, firms (or organisations) and hybrids. In line with the broader definition of institutions used in this paper and the focus on sustainable development, institutions at this level of the Framework in Figure 3 can shape value creation, capture, translation, modes of thinking, feeling and action of consumers and employees, their values and goals. Building on our revised understandings of institutions and value from this framework, that have been developed thus far and due to their importance to sustainable production and consumption, this section explores the governance role of markets and organisations as value and values articulating institutions for sustainable production and consumption. This provides a different perspective than would conventionally be covered in mainstream economics where the focus is value as utility (for individuals) and exchange value for individuals (consumer surplus), organisations (profit – producer surplus) and economy wide value goals (growth in GDP).

4.7.1 Markets as institutions and sustainable production and consumption

Markets are essentially value articulating institutions. The value they articulate (through prices) is exchange value, as valued by the market and determined by the amount consumers are willing to pay and producers willing to supply. Ultimately, since the beginning of the industrial revolution, it was the notion of exchange value and a 'product' embedded with 'utilities' which became the dominant focus of neoclassical economics and the form of value that markets were developed to articulate (Marshal, 1927; Walras, 1954 also see discussion in Ng and Smith 2012). As identified in 4.6, this notion of value, alongside the narrow focus and assumptions of mainstream economics, has not served society well in staying within environmental limits. Exchange value does not even articulate well, any other value beyond exchange value (for example the extent of use value is often not well reflected in exchange values), very often dis-value generated by production and consumption are missing from the market valuations (which led to the early work by authors such as Kapp on social costs). Markets (as currently designed) focus on flows in financial terms of goods and services and determine (exchange value) prices, price is used as a basis for allocation of resources - to those that are willing to pay the price (one could assume that these are the ones in most need). In reality, those that are willing to pay higher prices may need the good or might just have a higher income. Therefore, willingness to pay is a poor proxy of consumption need, especially when income inequality is high (such as in the UK and US).

Additionally, increasing prices (to factor in externalities) is not always an effective way of altering the selection environment to shift consumption patterns to attain a desired restructuring of the economy as identified earlier. It is very difficult to cost many social and environmental externalities, particularly ecosystem functions (see Centemeri 2009); and beyond issues already mentioned, value embodied in price can serve to illustrate wealth by consumers and therefore in some situations encourage and motivate them to pay the higher price (Veblen 1899). Additionally, if incomes are high or if the product has a relatively inelastic price elasticity of demand (such as energy, see for example Duerinck, 2009 and Narayan et al, 2007), then the price change or added taxation will often do little to reduce consumption and can exacerbate inequalities. This framework argues that relying solely on price and economic incentives from the market as an institution to address environmental sustainability (such as set out in Dzeraviaha 2018), is not aligned with a precautionary or strong approach to sustainability, even though it is very popular amongst many economists. The approach works in theory, but relies on unrealistic assumptions. The current framework advocates that the mainstream economics paradigm with it's focus on profit and GDP (exchange value) maximisation and selfishness, has largely driven the environmental crisis (given that it is the scale of resource flows that is driving key global environmental pressures). As Albert Einstein's put it: *"We cannot solve our problems with the same level of thinking that created them."*. The current paper contends that neoclassical economics, does not have the adequate insights, tools and solutions to address the scale of the challenge's society is facing.

In relation to physical throughputs and resource allocation, the price of finite resources in an economy at any given time is a function of current levels of supply (in the market) and demand (in the market) for that resource, and therefore the price of the resource articulated by the market (as an institution) does not adequately take account of the stocks 'in the ground' or 'in the ocean' (potential supply constraints). It also does not take account of 'potential demand' in the future, only current market demand today. This said it should be recognised that markets do take into account a level of the current generation's speculative behaviour, which embody some assumptions about the future. Therefore, prices (and value) that are articulated by markets as institutions do not adequately reflect both potential future needs/wants and supply (determining future scarcity) that could occur in time, only 'real' scarcity in the marketplace today and a level of speculation about the future (by the current generation). Additionally, cheap prices for material resources can often encourages material consumption and material throughput in the economic system. If resources are used more sparingly today of course, this increases supply in future keeping prices low for future generations and contributing to keeping efficiency in extraction high which is economically beneficial. This requires a complementary set of resource conserving and material care cultures and behaviours and economic strategies to be actioned in both consumption and production (complementary institutions at L1 and L3), but also changes to markets as institutions to better allocate resources through time. Higher prices can have a negative feedback through the market and lead to lower consumption in the short run, in the longer run the price

mechanism of the market however actively acts against physical resource conservation, higher prices in the market (occurring when there is market scarcity) encourage high entry of firms into the market and increased extraction resulting in reduced stocks in the ground (or ocean) through higher 'unearthed' (or fished) stocks in the market now. This brings down prices in the market now (leading to increased consumption) but increases potential for unavailability and higher prices in future; essentially transferring a burden to future generations and making future needs less easy to attain. In essence, in these ways (for producers), the price mechanism works against resource conservation and drives a relentless innovation in resource extraction (not provision now and in the future). In terms of resource conservation, technology can be part of the solution, but it is also often part of the problem, when applied with ill-fitting economic management and policy. In industrial manufacturing, innovation in resource efficiency can reduce materials used per product, but clearly this reduction in materials per product is currently made up for by the growth in scale of production (See Jackson 2009); often to ensure resource efficiency in industrial production, there is a need to increase scale 'resource efficiency at scale'; and yet it is the scale of material flows that is driving quite a number of the key global environmental pressures (see Allwood et al 2011). Latest evidence in Figure 6 shows very little decoupling of material flows from GDP globally.

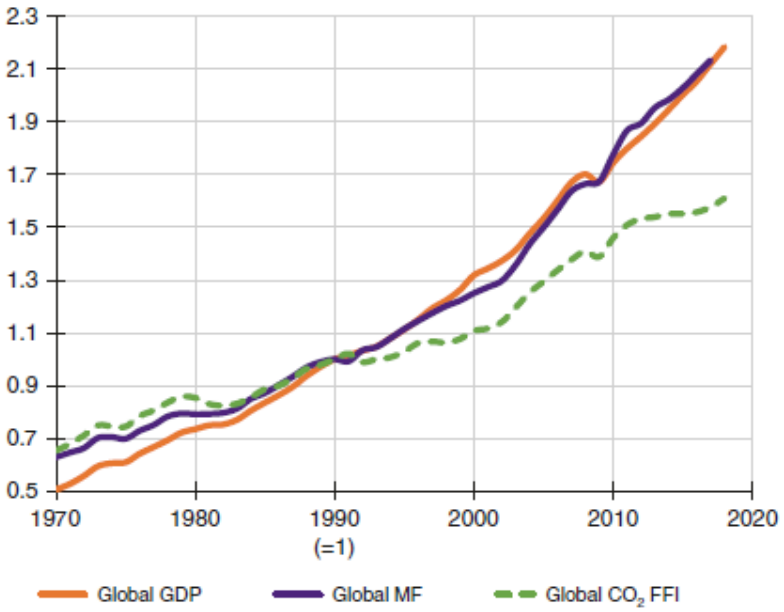


Figure 6: Relative change in global economic and environmental indicators from 1970 to 2017 (Weidmann et al 2020).

These observations point towards a need for economists to innovate markets as institutions to better provision physical resources through time and across generations (particularly scarce finite and renewable ones) and ideally by place and people in a more intelligent way. Beyond ensuring resources for current and future generations, this can also substantially help ensure environmental integrity, as the scale of material flows through society and economies is driving the breaching of many boundaries set

out for key global environmental pressures (Allwood et al., 2011). There is a need for digital technologies to be innovated alongside the market as an institution to help markets perform better as institutions in allocating resources within and between current and future generations at level 3. This is a key area for urgent research, how can markets better provision materials though time and additionally pick up on qualities of flows not just quantities.

4.7.2 Markets and their functioning as institutions

Building on the taxonomy of how institutions influence economic behaviour outlined by Dequech (2003), markets function and influence economic behaviour in forms that mirror the different functions that institutions provide in two ways:

Firstly this section treats with the informational-cognitive function of institutions (in the sense that markets provide information to individuals); Market prices: 1. help decisions of consumers and business purchasers and investors, i.e. when to buy inputs to production and how much? Which company to invest in by looking at historic market data to inform when to invest and what in and the likelihood of value return from investment (exchange value) etc. and 2. Market data helps consumers compare a producer's price (with the average market price at a reference point in time), and therefore whether they are perceived to be 'good' and of value (in exchange value terms).

With regards to the deeper cognitive functions of institutions (the second function) and their influence on people's perceptions of reality: Through communicating value, markets can communicate 'good' to the consumer or investor. These markets then influence perceptions of consumers and investors about what is good. For a company, the prices of their goods might be low, which for some consumers communicates 'good' to the consumer, the issue is this value articulation is often a false perception as most often the full value and dis-value of the product is not articulated in the market price. The solution to this problem advocated by environmental economists is to make sure that all positive and negative externalities are factored into the economic system and market price. As stated, however, this is a theoretical approach, relying on a set of unrealistic assumptions, which are difficult to implement in practice, it also puts too much reliance on the consumers and producers to be rational and respond to price (there are also other issues with such approaches see Centemeri 2009 and Martinez-Alier 1995). Some consumers also see higher prices as indicating higher quality and some specifically want to buy higher priced goods to signal wealth and prestige (Veblen 1899). Weidmann et al 2020 identify that affluence and consumption have continuously increased resource use and pollutant emissions far more rapidly than these have been reduced by technology thus far.

4.7.3 Organisations as value articulating institutions and sustainable production

Much NIE work maintains the premise and assumptions (from Neo-classical economics) that firms are profit maximising and agents seek to maximise their utility, however, assumptions such as perfect information and rationality are dropped for the assumption of bounded rationality (Simon 1957). This said there is variance in the field in these respects as outlined in Rutherford 2004. The focus of such work is most often on addressing organisation and co-ordination that improves economic efficiency. In terms of sustainable production and consumption, this tells one little about the use value and dis-value generated for individuals, organisations and society and the environment. Looking at the state of the environment and economic growth currently in society, it is clear that the focus of some firms on profit maximisation has often occurred to the detriment of other stakeholders and types of value, such as maintaining species and ecosystem integrity. Therefore, the current paper contends that economists and business need to be considering whether these traditional goals (institutions in themselves) for firms are the right ones to apply to ensure a sustainable economy. Should firms strive to be maximising? If so, what should they be aiming to maximise and for whom? Which types of value/dis-value should be prioritised? The current author argues that the focus of Governance (level 3) for sustainable production and consumption should be a set of goals for organisations that go beyond maximising profit for the organisation and or utility of the individual and look at the value/dis-value from different organisational structures for the range of stakeholders - individuals, organisations, society and the environment (see arguments made in Bradley et al 2020). However, to enable this, it is likely that the wider business and institutional environment at levels 1 and 4 will need to change to tilt the selection environment of the economy to make it viable for organisations with these goals to thrive. Essentially the current framework argues that a more intelligent, systems integrated approach is required in provisioning consumption and production activities (in line with Clift and Allwood 2011). This is likely to require innovation in the general paradigm of what good economic development is and should be (hopefully aligned with sustainable development), alongside change in institutions (formal and informal) and technology.

4.7.4 Organisations and their functioning as institutions

Building on the taxonomy of how institutions influence economic behaviour outlined by Dequech (2003), firms function and influence economic behaviour in ways that mirror the different functions that institutions provide: Firstly this section treats with the informational-cognitive function (in the sense that firms provide information to individuals); this is both the information to individuals in the firm in order to organise production, but also the information that they provide to consumers (through information on product packaging, and resulting transmitted descriptive norms that their production and consumption may signify). There is also direct transmission of information via marketing messages to potential consumers via radio and TV etc. With regards to the latter, firms also provide the deeper cognitive functions of institutions (the second function outlined by Dequech 2003), their influence on people's perceptions of reality; effecting consumers via marketing tactics, and employees via

company's training programmes about what it is that the employee should aspire to be within the firm. I.e. what mission, activities and goals they should be seeking to align with or optimise towards when operating within the firm. Related to this, it is also clear that many firms often induce a valuative function (valuative aspect of culture, identifying culture as providing values), i.e. the 'company culture', values and identity that employees operate within. Culture also has the potential to influence perceptions outside of the firm, via reputation. The forth emotional function of institutions as outlined by Dequech (2003), said to relate to the expressive, or affective aspect of culture is also relevant. This may seem less apparent, but firms' products and services sometimes have the potential to transmit feeling, meaning and emotion, for example when consumers buy gifts for loved ones to convey affection or gratitude (and products are often marketed to appeal in this way by firms) e.g. a box of chocolates. In these examples, firms function as institutions in ways that match all of the four ways/functions that (institutions) can affect economic behaviour and create a set of informal (behavioural) complementary institutions 'modes of thinking, feeling and action' both inside and outside the firm and specific to the organisation. So, firms act as formal institutions as often treated in NIE (with formal constraints e.g. contracts etc.) but also can act as informal institutions that shape employee and consumer behaviour.

In relation to the institutional economics of sustainable production and consumption, there is a need to research empirically the formal, but also the informal institutions (not just rules) that operate at the firm or organisation level, and how these institutions impact the move to sustainable production and consumption (for the range of relevant stakeholders - individuals, organisations, society and the environment). So essentially: What are the organisational arrangements (formal institutions) and ways/modes of thinking, feeling and action within the organisation (informal institutions), that enable the organisations to motivate entrepreneurial, employee and consumer activity towards a sustainable production?

4.7.5 Business model change and the influence on the firm as a value articulating institution

The study of sustainable business models (a lens to explore organisational governance forms/structure) in tandem with institutional analysis could help explore the latter question. Following Velu et al 2016 (p.3): "*business models provide opportunities to frame how value can be realised from existing assets*". Additionally, it is stated that: "*A business model is a holistic, contextualised pattern of attributes (and activities) representing value proposition, value creation, and value capture*." Seeing firms as institutions, as this framework does, a change in a firm's business model (governance) can inform the way in which firms function as institutions: i.e. 1.) how the firm influences employees and consumers behaviour as a "constraint or enabler"; 2.) the information provisioning functions of firms; and 3.) the firms influence on perceptions of reality (for both workers and consumers). The way the firm functions as an institution can depend partially on the business model applied. Additionally, the potential to move towards a new business model and set of related behavioural institutions can depend on the current and

predominant formal and informal behavioural institutions in place. The evidence that existing institutions shape the potential for and barriers to new alternative business models and value creation and capture is clear in the literature, but also somewhat under explored: Boons and Ludeke-Freund (2013) identify that cultural barriers can result from existing business rules, behavioural norms, success metrics for the organisation (Johnson 2010 and Lovins et al 1999). Boons and Ludeke-Freund (2013) identify that cultural aspects are under researched, for example they ask: "*To what extent do firms consider the normative requirements for sustainable business models in their innovation practices – be it process, product, or system oriented?*" Similarly, Zollo et al (2013, p. 244) identifies that: "*Core questions about the micro-foundations (individual and group level behaviours and their psychological antecedents such as motivations, cognitive frames, emotional states, etc.) of internal dynamics that might facilitate or hinder the emergence of sustainable enterprise models have received relatively scarce attention, despite the general consensus on their salience*". Ceschin 2013 stresses the importance of consumer habits, and identifies that for customers the main cultural barriers to more sustainable business models are the move from ownership of a product to having a need or want fulfilled without ownership of a product (Goedkoop et al., 1999; Mont, 2002; UNEP, 2002) in product service systems. The current framework could be useful in exploring informal institutions as barriers to ownership and change in technology of provision (L1 consumer analysis). Boons and Ludeke-Freund (2013) citing other literature, identify additional barriers from dependencies within supply chains and infrastructures which create "locked in" (Wells 2008; Wüstenhagen and Boehnke 2008) – exiting physical environment (in the framework) and existing organisational arrangements and transactions within between firms (these can be addressed by NIE approaches at L3). Halm et al (2014) identify that: "*attitudes, experiences and contracts between people and organisations are of crucial importance*". Contracts between people and organisations act as a form of 'constraint' (level 3). Analysis from NIE at L3 (beyond the focus on informal that has most extensively been treated with in the current framework) could be usefully adapted and applied to research such issues and find solutions.

In these ways, institutional research in tandem with business model research, can provide powerful tools to address governance for sustainable production. Any firm or organisation will have a given institutional form and context that will help or hinder creation and capture of certain types of value and that may help or hinder the avoidance of dis-value and the move to an alternative model such as more service-oriented model (Baines et al 2020). This is hypothetical illustrated in Figure 7.

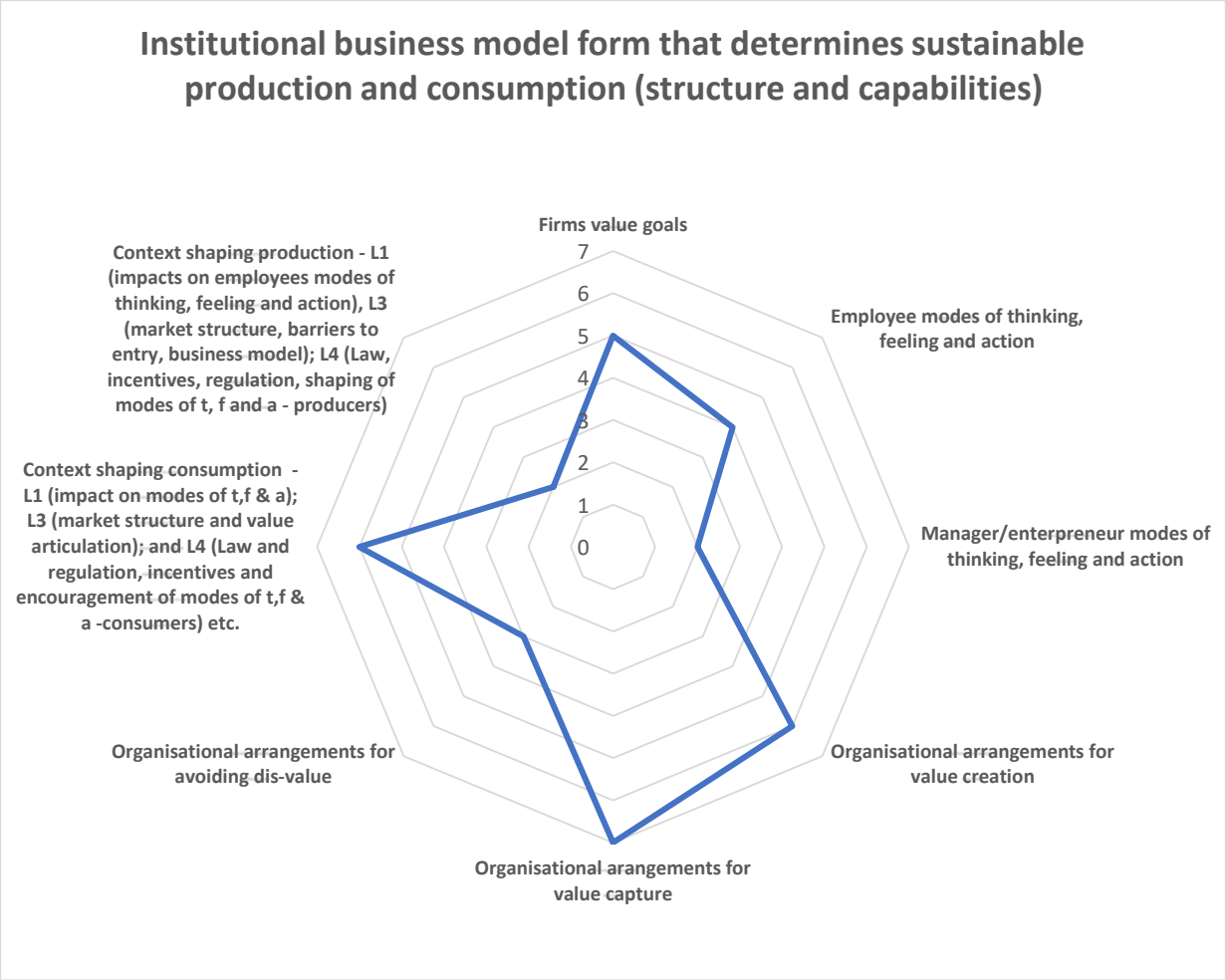


Figure 7: Institutional business models form that shapes sustainable production and consumption

4.8 Institutional environment

4.8.1 Introduction;

Governance structures, whether firms; markets or a hybrid public private enterprise are influenced and constrained by the institutional environment within which they reside (Williamson 2000). Williamson (2000) focus on economic outcomes resulting from the institutional environment. The institutional environment includes property rights; the laws and the law system, and other deigned rules of engagement developed by government. Essentially, the formal rules of the game are said to include Property rights, polity, judiciary and bureaucracy (policy and regulation etc.). Polity is defined as "*a form or process of civil governance or constitution*", judiciary is defined as: "*the judicial authorities of a country, judges collectively*"; and bureaucracy "*A system of government in which most of the important decisions are taken by state officials rather than elected representatives*" (Oxford English Dictionary 2019). Legal rules generate incentives or disincentives for actors' subject to the legal system to behave and act in certain ways (Korpbkin and Ulen 2000 as seen in Williamson 1991). J.R. Commons was key in developing the early movement in law and economics and brought important ideas to the

study of institutional economics (as identified in Williamson 2000). Rutherford (2004) identifies the "Commons tradition", due to its emphasis on transactions, property rights, and organisations – has closer links with the NIE than does the Veblen-Ayres tradition". This said the approaches of Commons are somewhat different. Much work in NIE is focused on, Positive Political Theory (PPT) which is concerned with working out the economic and political ramifications of Level 4 (level 2 in Williamson) features. Much of the economics of property rights is said to be of a Level 4 kind. This said in relation to ensuring sustainable development (as opposed to just economic development) it is contended that there is a need to go beyond just a focus on focus on property rights and their definition and enforcement. This becomes clear when looking at the approaches that environmental and ecological law scholars are advocating to ensure sustainable development. Interventions at this level have the potential to encourage or incentivise, prohibit, or create obligations on certain forms of production governance (occurring at L3) and consumptions (occurring at level 1). Tilting the selection environment towards sustainable consumption and production. It is useful at this point to identify a range of areas where one might make changes to institutional environment to encourage sustainable development. Key elements of legal systems are outlined below in Table 1.

Table 1: Structure and key elements of legal systems (Garver 2019)

System feature	Key elements
Context globally	• Worldview
	• Relationship with economic, political and socio-cultural systems
	• Relationship with ecological systems
	• Relationship with technological systems
Legal mechanisms	• Constitutions
	• Codes and statutes
	• Bills of rights
	• Executive decrees, orders, edits etc.
	• Administrative rules, regulations and orders
	• Judicial decisions (common law, civil law, etc)
	• Treaties and international agreements
	• Other international law
	• Legal plurality: culture, tradition, custom, etc. that informally yet constantly governs behaviour (M' Gonigle 2008)
Actors, agents and power structures (may exist at all scales from global to local)	• Governance regime (democracy, dictatorship, etc.)
	• Legislators/parliamentarians
	• Judicial/quasi-judicial (judges, arbitrators, etc.)
	• Commissions, independent bodies, auditors, etc.
	• Individual citizens
	• Juridical "persons" (e.g. corporations, "rights of nature")
	• Civil society
	• Public/government entities
Key arenas (may exist at all scales, from global to local)	• Basic rights and responsibilities
	• Property (private, public, common, things not "owned")
	• Finance, tax and money systems
	• Contracts
	• Corporations
	• Criminal justice and tort liability (non criminal)
	• Commerce and international trade
	• Environment and biodiversity
	• Energy and natural resources
	• Government, politics and elections
	• Health and social safety net
	• Education
	• Labor
	• Agriculture and food systems
	• Cities and urbanization
	• Transportation
	• International relations and security (e.g. armed conflict)
	• Art and creativity

Garver builds in the work of Meadows (1999) to identify leverage points, different places to intervene in the system where one could act to induce change for sustainability. In order to explore how changes in elements of the legal system could help create a selection environment for a sustainable economy, a range of changes and interventions looked are explored in Appendix 1 (applying Garver's 2019 to identify the relevant system leverage points). From analysis conducted in Appendix 1 it is clear that ecological and environmental law scholars have lots of ideas on how changes at this level might help ensure sustainable development and sustainable production and consumption, these changes act on different leverage points in the system. Alongside and beyond the current focus of NIE scholars on

such things such as economic outcomes of alternative property rights arrangements, it is clear that there are many other potential interventions at this level that could be undertaken and much work to be done to explore potential of such interventions. There is a key role for institutional economists to engage to explore and evaluate the effectiveness of such approaches for a sustainable economy on various criteria. For example, are such changes in institutional design and architecture at L4 likely to lead to economically viable economies, that are able to provide high levels of wellbeing for citizens and communities, and at the same time avoiding dis-value to society and the environment? Additionally, what ethical considerations need to be considered in making any changes at this level (and other levels). Such analysis might make use of approaches from NIE, but equally approaches from classical institutional economics may be very useful such as Multi Criteria Decision Analysis approaches in conducting evaluations of alternative policy etc. Such approaches have clear applicability to the issue of sustainable development and could allow one to take a more precautionary approach in evaluating interventions at L4. Due to the length of the paper there is limited scope to investigate this level further at this point in the paper, but clearly this is an area requiring further research.

5 Discussion

5.1 Compatibility of classical and new institutional economics in the light of the issue of sustainable production and consumption

Rutherford 2004 argues that the extreme positions in both NIE and classical institutional economics are untenable. An extensive work on the subject of compatibility of the two schools of thought was undertaken by Rutherford (2004), we therefore make use of this extensive work to inform the debate in the light of sustainable production and consumption. Although NIE and classical institutional economics have differences, Rutherford identifies commonality for example: "*Many individualists do recognise that the social whole deeply influences the individual, while many holists do agree that only individuals, not institutions, can act as agents of change. Similarly, even "behaviouralists" like Veblen do not entirely exclude rational choice and economizing behaviour, while "Among more orthodox economists there is an increasing recognition of the limits to optimising behaviour and the significance of "rule following"* (page 5).

The current framework with a focus on sustainable production and consumption takes a middle ground (rather than an extreme position) and tries to build in behaviourist institutional insights from classical institutional economics into Williamson (2000) in a broadly reconcilable way to address sustainable production and consumption. Although identifying some further areas needing more research. Williamson (2000) is used as the broad shell of the framework. Williamson (2000) and NIE typically largely neglect the level of embeddedness, the current framework made substantial effort to

build in classical institutional economics understanding of institutions (with a behavioural focus) at this level and to look at value and resource allocation (L2) in a way more appropriate to sustainable development, and carry through these understandings of institutions, value and resources into the rest of the framework.

5.2.1 Self interest and other regarding behaviours:

The Williamson 2000 framework seems to largely assume self-interest, selfishness and opportunism of human actors (broadly in line with mainstream economics). Rutherford 2004 identifies the need in institutional economics for a broader conception of human motivation that can accommodate both those aspects that respond to self-interest as narrowly defined and those that are driven by other ideals or psychological needs. Similarly, Psychologists have shown that people most often have both self-regarding behaviours and other regarding behaviours and that there can be a tension between them, yet both are vital to survival (See Schwartz 2006 and Schwartz 1999) and are drawn out dependent on context. Jackson (2009) argues that other regarding behaviours are particularly important and that that these need to be draw out for a sustainable economy. Therefore, the current framework integrated inter and intra personal pluralism as more realistic and required for the current framework: *"intrapersonal pluralism means that agents may hold multiple values and have to decide which values are to inform their preferences in a choice situation." "Interpersonal pluralism means that agents may be informed by different values in the same choice situation, and arrive at either the same or different choices."* (Paavola and Adger 2005, p.359). This allows that in some situations, assumptions that people are opportunistic and selfish do hold (aligned with NIE), so in this sense is compatible, but does not tie the analyst into always assuming self-interest, selfishness and opportunism, it depends on values and context.

5.2.3 Formalism:

Classical institutional economics rejects the more orthodox neoclassical forms of theory and model building as overly formal, abstract and narrow. Much of Williamson's work is arguably more formal than some classical institutional economics work, but Williamson has at times been criticised for a lack of formalism by more neoclassical oriented economists. Williamson points to greater formalism as a goal, but expresses the view that formalism can result in losses and is not desired at any cost. See discussions in Rutherford (2004 p.23). Interestingly work from Mitchell is informative in this respect, he considered the scientific method to consist of: "*the patient process of observation and testing – always critical testing – of the relations between the working hypothesis and the processes observed," as contrasted with the method of orthodox economics of "trying to think out a deductive scheme and then….verifying that*" (Mitchell 1928, 413-415). The current framework has walked a similar line of trying to formalise where possible at this point, for example in defining institutions, models of consumer and employee behaviour and rationality, but is arguable not over formalised at this point,

due to being a first attempt at an institutional economics framework focused on sustainable production and consumption as opposed to economic development. The current author has attempted to avoid 'locking in' the framework to rigid and unhelpful formalisations, but where evidence is available we have attempted to incorporated to inform the approaches and formalism taken in the framework.

5.2.4 Rationality:

Most mainstream economics interprets rationality in maximising or optimizing terms (Rutherford 2004). Williamson 2000 endorses bounded rationality and it is now very prevalent in NIE. To classical institutional economics, habit and rule following behaviour can be quite at odds with orthodox notions of rational maximisation, and yet rationality is not eliminated. OIE has never rejected the idea of rationality in any wholesale way (Rutherford 2004). To many classical institutional economics scholar's business habits and routines are better adapted or more rational owing to a well-defined end (profit). However, Veblen ([1909] 1961: 238) makes the point that rationality in pecuniary matters is something that is particularly encouraged by the prevailing institutions and customs of business enterprise (context). The current framework is compatible with Williamson (2000) and much NIE, as it assumes bounded rationality, but to make compatible with the classical school of thought, it incorporates Vatn's (2005) approach of integrating the individual model into the wider perspective of social construction. Which leads to the next focus.

5.2.5 Holism versus individualism

Methodological individualism can be summarised in three statements:

i.) *"Only individuals have aims and interests;*

ii.) *The social system, and changes to it, result from the actions of individuals;*

iii.) *All large-scale sociological phenomena are ultimately to be explained in terms of theories that refer only to individuals, their dispositions, beliefs, resources, and interrelations."* (Rutherford 2004, p.31)

Individualism is the professed methodology of NIE; but individualism in NIE also varies (Rutherford 2004). Holism is focused on the social influences that bear on individual action, and holists tends to emphasise the priority of the social over the individual. Further, Rutherford (2004) identifies that the proponents of classical institutional economics are self-professed holists, but what they mean by holism varies to some extent. For example, Veblen stressed the importance of dealing with human action within the context of the surrounding institutions. Rutherford further states: "*Veblen believed that social customs', conventions, and norms played a large role in shaping the goals, aspirations, and behaviours of individual members of a society. In Veblen's view, such conventions and norms initially grow out of the "habits of life"., of the group, patterns of thought and behaviour that are*

derived primarily from the then prevalent methods of livelihood. Material and technological conditions shape patters of life and these in turn become conventionalised. Habits of life also include certain ways of thinking that become conventional. These include the community's technological knowledge and commonly held values and beliefs." Rutherford identifies that, one may agree or disagree with the details of Veblen's work, but virtually all of his work that deals with action within a given institutional system is entirely compatible with the methodological principles of institutional individualism. The current study employs a behavioural definition of institutions by Kapp 2011, as it is relatively more up to date and a good fit for the framework. The current framework integrates the individual model into the wider perspective of social construction (following Vatn 2005) so in this sense is compatible with the individual focus of Williamson 2000 but acknowledges a strong role for social context and social construction in informing preferences and production and consumption behaviour.

5.2.6 Maximisation:

Classical institutional economics consistently rejects the dogmatic maximising perspective and instead things such as habit and 'rules of thumb' replace exact calculation. Williamson's 2000 work is less focused on assumptions of maximising behaviour than some others in the NIE, but much NIE does seem to assume maximising behaviour. The current framework is more aligned with the classical institutional economics school of thought here, and do not assume that people are always maximising their own utility (although sometimes they can be more towards this) as this is aligned with the evidence. Although larger firms may be more towards profit maximising, many small and medium sized firms which make up much of the economy, are often not profit maximising in practice, see for example Webber et al 2017 and Leonhardt et al 2017. The current paper points out that other regarding behaviours (in both production and consumption) exist and are important to survival and a sustainable economy. Additionally, in relation to sustainable production, the mainstream economics assumption that the main goal of firms is to maximise profits is not in alignment with sustainable development (see Bradley et al 2020), particularly when many externalities (and dis-value) are very difficult to factor in (if not impossible) in monetary exchange values terms, alongside the fact that consumers and producers are not rational.

5.2.7 Success criteria:

NIE tends to explain institutional change in overall economic efficiency or net benefits. Building on pareto efficiency implies that resources are allocated in the most economically efficient manner without making anyone worse off (or the more workable solution whereby if people are made worse off, then they are compensated). In relation to sustainable development, measuring success in this way does not substantially explore or address issues of inequality. In the classical institutional economics literature, the success criteria are different. From reading, the Veblen and Ayres stream of

work, seem focused on investigating institutions and institutional change (and more predominantly informal institutions) to try to ensure instrumental value comes forth and not just pecuniary value and benefit. In Common's work institutions are seen largely as the outcome of formal and informal processes of conflict resolution, the criterion of success being whether the institution has generated a "reasonable value" or "workable mutuality" out of conflict.

The current framework proposes that success for sustainable development needs to include economic viability considerations but also other criteria such as avoiding dis-value to the environment and society (alongside ensuring longer terms instrumental value). So, in this sense the framework of the current paper advocates assessing economic efficiency alongside, building in consideration of dis-value and instrumental value that may be missed by standard market valuations (and environmental economics approaches to capture these) but via cultural shifts (at L1) innovation in governance structures (at L3) and changes in the institutional environment (L4). The paper has argued that this is more likely to create a selection environment where dis-value and instrumental value considerations are factored in sufficiently to ensure sustainable consumption and production. So, the current framework puts forward an alternative institutional approach to sustainable production and consumption. With such an approach, it will be important to address potential inequality and ethical considerations (amongst other criteria).

5.2.7 The role of government:

NIE and CIE both stress the role of democracy (Rutherford 2004), which the current framework is obviously also aligned with. NIE is more favourably disposed towards markets and less government involvement generally, classical institutional economics is more favourably disposed towards government intervention (and those such as the Veblen school of thought are often highly critical and suspicious of businesses), see Rutherford (2004). The current framework takes a middle ground and argues that both are important and required; businesses and markets are central to bringing forth at speed a sustainable economy, but only in the right selection environment with an appropriate institutional environment, and social embeddedness that can draw out self, as well as other regarding behaviour. Businesses can sometimes be key drivers in the move towards a more sustainable economy, but in the current institutional environment and social embeddedness of our economies and with current economic management and policy, often individualistic, materialist values are over encouraged and excessive use and consumption of materials and pollution in meeting short terms needs occurs which inhibits a sustainable economy. In essence, businesses and markets (in the current context) are too often at the driving seat of ecological degradation rather than driving the solutions. Literature such as Ashford and Hall (2011) shows that if designed well and carefully, some types of government intervention such as careful regulatory interventions can result in radical innovation (as opposed to incremental) by businesses for improvement of the environment, whilst substantially

reducing longer term cost curves. This is not to say that some economic instruments such as taxation cannot play a role, particularly as they can have dynamic efficiency benefits, but they should not be relied upon as an approach alone for reasons laid out in the paper. Regulations are most often good at ensuring environmental outcomes; arguably in the current context of climate change, this is what is most urgently needed. The urgency of climate change requires an ambitious and systems wide response; but with careful design. Additionally, in putting in place and selecting best policies and intervention, economic cost and efficiency is an important criterion, but should not be raised above and to the detriment of achieving environmental and social goals. This is clear when one considers the costs of failure to address climate change, the largest market failure ever seen (Stern 2006).

5.2.8 Evolution vs design:

In both NIE and classical institutional economics scholars have recognised that institutional change can be deliberately designed and enforced or may evolve in unplanned or "spontaneous" processes. Different writers and groups have, however, placed very different emphasis on the two. Many writers in NIE have put heavy emphasis on evolutionary processes, but arguments on deliberative institutional adjustments, however are far from being absent (Rutherford 2004).

Within classical institutional economics, Veblen is said to have given most attention to non-deliberative processes, whereas Commons emphasises the opposite. This said, neither is said to excludes the other process from their analysis. The emphasis of Veblen behaviouralist approach is said to be on non-deliberative processes by which institutions and institutional systems develop. Rutherford 2004 identifies the language of natural selection to be used by Veblen to describe certain processes, however he identifies that Veblen does not discus judicial or political processes in much detail, but clarifies that institutional systems are stabilised by the formal establishing of social conventions and norms in law and constitutions ([1919} 1964:17-18).

Rutherford (2004) identifies that the outcomes of competition depend on the nature of that competition and the criteria of "success". Rutherford, further states, the social or aggregate consequences of decentralised individual actions may be undesired. In relation to ensuring sustainability, all of the latter are particularly relevant in the unsustainability of economies. The dominant focus of 'success' in mainstream economics and the diffuse pollution and ecosystem loss from many small individual actions in the system, are at the heart of the environmental integrity problem. A more holistic, integrated and systems perspective is urgently required.

Conclusions

The question of the current paper was: Can a framework for institutional analysis of sustainable production and consumption be synthesised that builds on classical and new institutional economics? The current paper found a way of combining insights from the two fields to enable a framework to explore the institutional economics of sustainable production and consumption. The core elements of the framework are now outlined.

NIE as set out by Williamson (2000) does not focus on Embeddedness (L1) and takes preferences as given in their focus on economic efficiency. This is so, even though effective demand (sustainable or not) in the economy is largely driven and shaped at this Level. Preferences have profound implications for the creation and allocation of value in the economy by sectors and subsectors and the subsequent value and dis-value that is created by the economy (for society and environment). To stay within environmental constraints, technological change is required alongside a cultural shift towards sustainable consumption and production. Therefore, it is timely and appropriate to 'build in' the classical institutional economics understandings and conceptualisation with their focus on technology and 'modes of thinking, feeling and action' (more behaviouralist understanding) into a framework to address sustainable production and consumption.

For Williamson (2000), analysis and focus at the level of Resource allocation and employment is of a neoclassical kind, getting marginal conditions right. Welfare is seen in purely economic (exchange value terms) in attaining efficient market allocation, increasing overall surplus (consumer and producer) and economic growth. The mainstream economics framework has led to a very strong focus on economic efficiency, which has clearly had some benefits to society, but also some substantial dis-value; which is becoming urgently clear in the form of environmental dis-value. Most often environmental and societal value are missing in the efficiency calculus and difficult/ impossible to price and factor in, even if the assumptions such as rationality, were robust (which they are not).

Recognising these limitations at L2, the current framework reconciled in the following ways: The institutional approach taken by the current framework at level 2 was to: 1. recognise value in broader terms and the limitations of a focus on exchange value and utility in ensuring a sustainable economy; 2. Recognise complexity and the range of relevant stakeholders that need to be addressed; 3. Define the different types of value relevant and important to sustainable development (including instrumental value and dis-value to society and the environment) and acknowledging that these are often not perceived by consumers. 4. Accepting that markets do not and cannot adequately capture such value in exchange value form. Acknowledging these limitations, means that levels 1, levels 3 and 4 become particularly important in addressing environmental and social sustainability of our economies, alongside economic viability.

Most work from NIE focuses on levels 3 and 4 (3 and 2 in Williamson 2000). At level 3, a large literature of NIE deals with the evolution of particular organisational forms. Rutherford (2004) identifies that the focus is upon on cost reducing properties of certain organisational forms and organisational innovations (following Coase 1937 and Williamson 1975). The approach to the firm found in NIE is based on the concept of the firm as a set of long-term contracts between owners of a range of resources. These long-term contracts replace for market relations between individual resource owners. The firms is therefore a coalition that, to continue, must provide some benefits to those who are part of the coalition over a purely market relationship or exchange transaction. When one looks at the forms of analysis conducted at level 3 in Williamson 2000 the focus is on cost reduction, economic efficiency and net benefits (economically). The focus and unit of analysis is at the level of transactions (Williamson 2000). The focus is to align the governance structure to the transactions of concern, so as to promote adaptation of autonomous and cooperative kinds that can be most economically efficient. The problem with the focus on best governance structures or organisational forms to govern transactions for economic development in terms of purely economic efficiency, is that little account is taken of the qualities of development only the quantities (exchange values). Dugger 1983 and others (see Rutherford 2004, page 124) criticise this focus for overlooking the fact that the organisation of firms, has other functions and responds to other factors than simply problems of agency and reduction of transaction costs. A focus and analysis of sustainable production must take account of transaction costs and exchange values, but also various qualities that occur with economic development. So, looking at optimum governance structures for sustainable economic development requires a focus on economic criteria (as might be measured in efficiency terms or exchange values form) but also the change in qualities (e.g. wellbeing; pollution attributes; associated ecosystem change and social impact from production) that impact sustainable production. So, the focus needs to be getting the governance structure right for sustainable development as opposed to purely economic development. This is not to say that much NIE work cannot be applied to look at the economic efficiency aspects of different organisational forms for sustainable production, it can, but this is only one part of the puzzle for ensuring sustainable production and consumption. In exploring sustainable production both formal (usually looked at in NIE) but also informal institutions (looked at in classical institutional economics) are important. Organisations were look at as value and values articulating institutions (building on conceptualisation of institutions and value modified at levels 1 and 2); the business model concept was made use of to further explore (as can be amended to capture both formal and informal elements). Markets were also looked at as value and values articulating institutions which led to some insights on the interaction between markets with physical resource allocation through time and meeting needs of current and future generations. This led to identification of a need to innovate markets to better provision physical resource through time (alongside changes in the institutional environment).

A potential issue that does need further research and analysis is that much work in NIE assumes actors are generally self-interested, and opportunistic, therefore the solutions that are seen as optimal embed an existing normative assumption of selfish, self-interested behaviour. Following Jackson 2009 the current framework recognises that other regarding behaviours are important in the move to a sustainable economy (as well as self-regarding). If the starting premise is that people are selfish and opportunistic, this will lead to research and solutions that predict and look for organisational forms that are optimal in this setting or context. It's not to say this is necessarily incorrect, in some context's actors will be opportunistic and selfish, but the premise is pessimistic of human nature and needs scrutiny for wider application in sustainable economy research. Hence the current framework argues for inter and intra personal pluralism (following Paavola and Adger 2005, p.359) and integrating the individualistic model into the wider perspective of social constructivism (following Vatn 2005). The current framework assumes bounded rationality and is coherent with much NIE work in this way.

At L4; Some mainstream economists are of the view that the solution to pollution issues such as climate change are to allocate property rights on pollution (such as emissions trading permits) and allow the market to work to address the problem. This is a mainstream economics approach to addressing environmental problems, but success with emissions trading schemes in addressing issues such as climate change and pollution has been mixed so far. Economists such as Spash (2011) identify many issues with such approaches. The current framework recognises that some mainstream approaches to create new or additional incentives can play a role in the move to a sustainable economy, but that there is a need for other forms of intervention beyond financial incentives. To rely on financial incentives alone is not a precautionary approach and there are a number of reasons why relying on environmental economics approaches alone will not ensure a sustainable economy. The current framework argues that in relation to sustainable production and consumption, at L4, there is a need to look at a range of solutions from various key element of the legal system. Therefore, at this level, the current framework explored a range of approaches being put forward by environmental and ecological law scholars to bring forth sustainable development. It will be important to empirically investigate different approaches on multiple criteria; clearly institutional economists can play a key role in such evaluations.

To summarise, the current framework argues that there is a need for economic systems to factor in a wider set of 'goodness' both short and longer-term value (some of which will be instrumental value but some not) and to avoid dis-value for society and environment, often not perceived by consumers or producers. A concern of the current paper is that this is unlikely to be achievable alone through solely an environmental economics approach. The current paper argues for an institutional economics approach. The papers main contribution is to: 1.) to provides an institutional economics framework with a sustainable production and consumption focus that builds in classical institutional economics

understandings (as well as new institutional). The framework outlines that a sustainable economy and sustainable production and consumption will require cultural shift (at L1); alongside changes in understandings of value and its measurement (L2); change in governance of markets and firms (L3) and changes in the institutional environment (L4). The paper sets out that institutional economists can play a key role in bringing forth a selection environment for a sustainable economy and sustainable production and consumption. A priority area for further research that come out from the paper is how can technology and institutional change better ensure physical resource allocation of markets through time?

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Appendix 1

Ross (2010) explores three legislative models for sustainable development. A first focuses on implementing binding legal procedures considered vital to implement sustainable development fully, such as creating strategy, reports on progress and wide consultation on processes. Current approaches typically put in place an obligation in statute form and follow up with either detailed guidelines or regulation. As always, getting the balance right is said to be critical. In the latter respect, the Wales Act 2006 is said to give too much discretion, whilst the list of principles used by Canadian government in the Quebec statute provides too much detail and prescription, which undermines legitimacy and enforceability. Ross (2010) concludes that putting in place obligations to produce a strategy and to pursue other steps such as action plans, spending reviews, indicators and targets would be a major progression forward in making the 'sustainable development toolkit' operational, applying the systems approach of Garver 2019, to this study this would provide ***new information*** and potentially ***negative feedbacks*** as well as ***dampening positive feedbacks*** between development and environmental degradation). Although it is said that this may not be enough to ensure a cultural change in government.

A second model explored in Ross (2010) aims to enhance the status of the sustainable development strategy by introducing a substantive duty across government to ensure its activities in integrating sustainable development are consistent with objectives and principles identified in the strategy. The latter approach ensures legal status, provides a clear point of reference for those implementing the strategy with obligations for implementing and improves understanding of sustainable development. It however, stops short of explicitly identifying the role of sustainable development in the workings of government. Ross identifies that that not doing the latter misses out on important symbolic benefits, and fails to address directly any inconsistencies in interpretation and application of sustainable development. The third approach is said to be to make sustainable development the central organising principle of governance in the UK. For this model to be operational, two additional legislative provisions are needed. Firstly, a clear declaration of purpose, by government about the role of sustainable development in all of its activities. The statement in the most recent Welsh strategy is said to work well in this regard (identified in their paper). Then legislation must impose meaningful substantive duties on all government bodies and it is said that such duties should do more than simply 'have regard to' or 'take account of' sustainable development. Ross identifies that there is a precedent for a stronger approach in previous states such as the example wording: 'contribute to the achievement of sustainable development'. In this sense sustainable development is at the core of government and the central organising principle, strong enough to potentially take on the role of legal rule and hence provide a framework for decision making across all government (Ross 2010). Applying Garver 2019 to this approach, essentially the leverage point here is ***goal change***, but also what comes with this is potential for change in ***mindset***, ***rules*** and ***new system structures*** to enable. The Autor concludes that it is time for the UK administrations to give sustainable development legal

backing, and identify that most importantly legal recognition will improve the education value of the strategy and heighten its status in the public eye (***mindset leverage point***).

Abbott and Marchant (2010) investigate five mechanisms for introducing institutional innovations to inject sustainability more directly into the process by which laws, regulation and policies are adopted and reviewed and enhance responsibilities of major units of government to further sustainability. There focus is on US Federal government. The five mechanisms are: 1.) An executive order; 2.) A sustainability impact assessment 3. A non -partisan Congressional Joint Committee on Sustainability; 3.) A federal Sustainability Commission; and 5.) A Sustainability Law Reform Commission.

It is said that a strengthened executive order on sustainability would complement the existing environmental justice executive order in that both extend beyond traditional environmental protection to consider ethical and social impacts (***new information flows*** potentially resulting in new strategy and policy that ***dampens positive feedbacks*** between development and reduced sustainability). However, it is identified that an executive order does not provide the same long-term stability and certainty as a statute (Rodgers 2001).

The new concept of a sustainability impact assessment (extension of EIA) provides a vehicle for institutionalising stronger consideration of sustainability across the federal government. These assessments are applied on proposed projects, and are static. They however, could be made dynamic. A more dramatic enhancement is said to be to extend the EIA beyond individual agency projects to include policies, programs and conceptual activities. A process referred to as strategic environmental assessment (SEA) allowing one to assess environment/sustainability issues as part of an overall economic policy etc (***new information*** leverage point, such new information may halt development or adjust it – ***dampening positive feedbacks*** between development and environmental degradation etc.). For various reasons explained in the paper, strategic environmental assessment might be a better approach than project-based sustainability impact assessment to incorporate sustainability. Limitations of EIA as well as benefits are discussed extensively, issues with SEA are also flagged up.

It is stated that: "*A joint Committee on Sustainability, drawn from both houses of Congress, would focus Congressional attention on sustainability issues that cut across many areas of law – and thus across the jurisdiction of multiple committees – elevating those issues in the Congressional Structure to a degree of prominence currently reserved for economic matters*." (Abbott and Marchant 2010, p.1930)

A Sustainability Law Reform commission is an independent body with legal as well as sustainability expertise that would review existing federal law from the perspective of sustainability and recommend amendments, enactments and repeals – so having an ex post perspective (***negative feedback*** *and*

dampening positive feedback). It would be an advisory body but could have significant subjective effects, for example through contributing to attitude/cultural changes within federal agencies and on the public (social evolution and potential changes in ***system structure*** leverage point). In commonwealth countries, the commission approach has been the most widely adopted. A key feature is the substantial degree of independence from government, parties and other political actors (as well as interest groups). In the article it is said that such organisations might even put forward areas where there is a need for new law/legislation and vision, as well as amendment/revision.

A sustainability Commission is an advisory body tasked with addressing a wide range of sustainability issues and hence a wide range of government agencies. Such an organisation could advocate and help executive departments/independent agencies develop appropriate sustainability policy, programs and regulation to address governments own operations and society at large. It could advise on sustainability legislation (***new information*** leverage point). Ex post it is said that such a commission could be authorised to review existing statutes, regulations and programmes from a sustainability perspective and in this way act as a ***negative feedback*** (leverage point) to enact change for sustainability if necessary. The commission could also educate the public (Abbott and Marchant 2010) and effect business and government strategy. The UK Sustainable Development Commission in 2009 provides good evidence of this, where they laid out the links between prosperity and growth in a report and this led to the book by Jackson (2009) on 'Prosperity without growth?' This had substantial impact on business, government, academic and society ***mindset*** (leverage point) and questioning conventional economic growth (**key leverage point**) as the main policy goal.

Abbott and Marchant (2010) then compare the five mechanisms, identifying that they vary substantially on multiple dimensions (institutional structure; function; authority and type of law and policy addressed). In their conclusions they state that they do not necessarily recommend uptake of all five mechanisms but that implementation of two or more could provide useful synergy. They also conclude that these institutional innovations alone are insufficient and one must define and operationalise sustainability principles in strategies, priorities, implementation of legal ***rules*** and ***indicators*** **(leverage points**).

Ashford and Hall (2011) investigate the relationship between environmental regulation, innovation, and sustainable development within a situation of increasingly globalised economies. They contend that the most crucial problem in achieving sustainability is lock-in or path dependency as a result of firstly, the failure to envision, design, and implement policies that achieve co-optimisation, mutual reinforcement of social goals, and secondly the issue of entrenched economic and political interest that gain the present system proliferating current unsustainable trends. The paper argues that industrial policy, environmental law and policy, and trade initiatives must expand the practice of integrated multi-purpose policy design. One of the key messages of the paper is that revolutionary

technological innovation required to address sustainable development requires stimulation through environmental, health, safety, economic, and labour market regulation. This said, the current author notes that economic instruments such as taxation can have dynamic efficiency benefits on producer behaviour (but that that this may not necessarily lead to significant innovation in technology).

The authors have argued from previous empirical evidence, that significant rather than marginal innovation may require displacement of incumbent firms and their technologies (Ashford et al 1979 and Ashford et al 1985). Synthesising empirical evidence and literature Ashford and Hall (2011) identify that trade can take two diametrically-opposed pathways, one of innovation-driven competition versus traditional cost cutting competition and these two pathways are said to have different implications for economic development, environmental quality and employment. Ashford and Hall (2011) identify changes in socio-technical systems as difficult and suggest creative use of government intervention as more promising in sustainable industrial transformations than marginal incentivising policies such as providing tax credits for adopting green technology which are said to leverage firms short term economic self-interest rather than deeper organisational on societal changes. They argue in developing a sustainable economy that change needs to be more systematic, multidimensional, and disruptive as opposed to incremental. It is said that this capacity to change towards sustainability can be enhanced by appropriate legal and policy interventions. They argue that addressing lock in and path dependence requires legal interventions not only to enhance capacity, but encourage willingness, opportunity and motivation to change on the part of incumbents and new entrants. They advocate that strong regulation (the **leverage point here is *rules***) can spur technologies, organisational, institutional, and social innovation, that result in economic and trade advantages which exceed shorter term gains from cost-cutting and trade expansion through neo-liberal policies that would otherwise weaken environmental and labour protection. They also identify that deeper changes are more likely to come from new entrants as opposed to incumbents (Ashford and Hall 2011) and that such new entrants often bring entirely new technologies with consequent dramatic reductions in costs whilst improving performance (completely different cost curves). In this way helping ensure long term shifts to more beneficial cost curves and ensuring longer term instrumental value (of which classical institutional economists are particularly interested). New regulation takes time to implement so effects can be ***delayed*** and occur at a later point in the system. Additionally, new entrants with alternative technologies, improved performance and cost structure can ***reduce positive feedback*** between growth of the economy and environmental impact.

Bosselmann (2010) Building on a range of literature, makes some strong observations and assertions in relation to dominant ***mindset, goals and paradigm*** (potential leverage points) in our current systems:

"*our capitalist culture has created a mythical belief that the economy matters more than anything else. Economic analysis has a privileged place in society's institutions and in public decision-making. As a consequence, decisions, some with deep moral implications, are now determined primarily by income and prices*".

"*Over time and in combination, anthropocentrism, individualism and economism have reinforced one another, nurturing the idea that a healthy environment is secondary to individual well-being*."

"*Typically, the environment is presented as a cost factor for the economy*"

(Bosselmann 2010, p. 2431)

The author also critically notes that the fragmentation of the environment into individual aspects is a common characteristic of environmental laws throughout the world and identifies to a degree this is inevitable (to ensure that laws are specific and enforceable on a case-by-case basis), yet they note that the lack of a foundational law that holds the environment as the foundation of life and the integrity of the ecological systems as non-negotiable is hugely problematic and observe that environmental law has largely not been effective in preserving ecosystem integrity. They state: "*By and large, administrators and judges have applied the Resource Management Act (of New Zealand) in a manner that limits or mitigates ecological damage, but does not prevent it in the first place. This is consistent with environmental laws and their application all around the world*." (Bosselmann 2010, p. 2433)

The author states: "*there is a fundamental human right to use and alter the environment rather than a right to use the environment in a sustainable manner*". Whether or not a use is sustainable should be clearly defined by law and not left to an "*overall judgement[24], i.e., the traditional viewpoint that juggles environmental, economic and social factors without giving priority to one over the other*." (Bosselmann 2010, p. 2432)

The author goes on to identify and state the following: "*Specific laws may prohibit incidents like felling a tree or killing an animal without reason, building a house without resource consent, uncontrolled discharge of waste, wastewater or chemicals. But these are exceptions to the basic right of individuals to use natural resources. In their accumulation, these user rights result in large-scale destruction of the global environment. At present, there is no general environmental rule that limits individual entitlements. Do we need such a rule? Absolutely yes. Can such a rule be defined and written into law? Again yes, as will be shown further below. Would it be socially acceptable? Hopefully. Would it be politically viable? Probably not. Or shall we say, not yet*." (Bosselmann 2010, p.2435).

Building on Bosselmann 2008, Bosselmann 2010 notes that if one traces the historical and philosophical foundations of sustainability from their beginnings and relate them to the corresponding

developments of legal theory and practice one can see an increasing gap between individual entitlements and responsibility for the commons. They state that this can be observed in the way that John Locke's idea of property rights developed with the modern concept of private property isolating itself from any common property responsibilities (Bosselmann 2008).

The author puts forward that it should be possible to design a general ***rule*** (this is the **main leverage point addressed**) that draws a line in the sand and sets a bottom-line limitation on individual entitlements. It is said that such a rule would apply throughout the system of law and governance and would not be confined to a single Act. This is the papers major proposal and recommendation, ensuring the sustainability of ecological systems, it is said, must be the bottom-line, yardstick and benchmark. The author supports the proposal by identifying that historically, science and ethics all support the idea that development must respect ecological boundaries to avoid decline or collapse.

Rodrigues (2014) use discourse analysis to critically examine local movements (***self-organising as a leverage point***) to recognise 'the rights of nature'. It focuses on local Community Bills of Rights and localised Rights of Nature ordinances. The author argues that although such measures engender the conditions for human communities to challenge (***a negative feedback in terms of leverage point***) the use and damage to the environment by multi-national corporations, effectiveness is limited as a result of the narrow, ideological and anthropocentric conceptualisations of the 'natural environment' (***mindset leverage point***).

A key conclusion of the paper is also that most Bills are confined to towns and cities with small populations; such localisation is a key limitation to the potential 'rights of nature' to reverse or prevent further environmental degradation by unsustainable corporate activity, especially when the effects of that activity cannot be restricted to the municipality in which activity is proposed (Rodrigues 2014). Nature also sees no boundaries made by human jurisdiction. This said the authors state that when people become involved in democratic decisions (***negative feedback leverage point***) to ensure the rights of nature at the local level, the potential for humans to change their relationship to nature can increase dramatically. An additional important conclusion is as follows: "*The challenge around language emphasised in this article reveals that, theoretically and in practice, enshrining 'rights' for 'nature' may be an effective discursive measure but an insufficient regulatory apparatus. At the same time, it is perhaps not reasonable to expect smaller-scale apparatus to resolve such deeply entrenched and difficult philosophical problems around; for example, what constitutes the non-human world, what responsibility humans have to the non-human world, and what measures can ensure adequate preservation and thriving of the non-human world in the face of increasingly destructive activity."* (Rodrigues 2014, p.192)

Garver (2013) similarly to Bosselmann 2010, states: "*The existing global complex of environmental institutions, from the global to the local level, has hardly prevented global ecological threats from worsening, and they seem unlikely to do so without radical reform*." (Garver 2013, p.234)

Garver acknowledges this and describes the inadequacies of environmental law (similarly to Bosselmann2010) in ensuring protection of the environment. Garver's response is to build on a range of existing literature (such as Berry 1999; Boyd 2004; Bosselmann 2008; Cullinan (2011). Boyd's (2004) notion of "sustainability law", Bosselmann's (2008) "Principle of sustainability" and Cullinan's (2011) "wild law" are all said to broadly capture Berry's 1999 ecological conception of law. Boyd is said to characterise sustainability law as "*a system of laws and policies that facilitate processes, products, and patterns of behaviour which are good for the planet*" (Boyd 2004, p.365). Garver states that for Boyd, "*Sustainability law would focus on transforming the relationship between humans and the natural environment from one based on minimising harm to one based on maximising harmony*" (Boyd 2004, pp. 364-365). It "*would be firmly rooted in science and the laws of nature, beginning with a clear understanding of the laws of thermodynamics and explicit recognition of the biophysical limits of the planet Earth*" (Boyd, pp. 364-365).

Building on such literature, the Garver 2013 puts forward a set of ecological law principles to replace as opposed to contribute towards environmental law. So fundamentally, applying Garver 2019 to this work, the approach here in not simply a ***change in rules***, but a fundamental change in to the elements ***world view; relationship with economic, political and socio-cultural systems; relationship with ecological systems; Juridical person and "rights of nature"*** the leverage points here are transformation in the ***paradigm, mindset and goals*** that would necessarily entail substantial changes in other leverage points of the system. Garver 2013 sets out ten principles for ecological law as follows (p.325- 329):

"*First, and most fundamentally, the rule of ecological law recognizes that humans are part of Earth's life systems, not separate from it*."

"*Second, legal regimes must be constrained by ecological considerations necessary to avoid catastrophic outcomes and promote the enhancement of life, with the socio-economic spheres fully contained within these ecological constraints*."

"*The planetary boundaries framework also makes clear that this approach must be systems-based which means that ecological law must track the interactive dynamics among the boundaries and the feedbacks, thresholds, non-linearity and other characteristics of the global social-ecological system. This systems-based approach must pay attention to both stocks and flows that are related to maintaining the earths life support capacity*."

"*Third, the rule of ecological law must permeate legal regimes and other disciplines like economics in a systemic, integrated way, and not be seen as a speciality area of law that applies to isolated problems*".

Fourth: "*The legal regime should support a radical re-focusing of the economy on reduction of its throughput of material and energy*."

"*Fifth, the rule of ecological law must be global, but distributed fairly using principles of proportionality and subsidiarity, with protection of the global commons and public goods paramount, and with constraints on property rights and individual choices as needed to keep the economy within ecological limits. A central challenge is to develop legal mechanisms for distributing global limits on the global aggregates of material and energy resources that the economy consumes*."

"*Sixth, the rule of ecological law must ensure fair sharing of resources among present and future generations of humans and other life forms*.

"*The focus on sufficient as opposed to maximum wealth implies a limit on inequality on wealth*.".

"*Seventh, the rule of ecological law must be binding (de jure or de facto) and supranational, with supremacy over sub-global legal regimes as necessary*."

"*Eight, a greatly expanded program of research and monitoring for improved understanding and continual adjustment of ecological boundaries and means for respecting them is needed to support the rule of ecological law, globally, regionally and locally*."