# System Views on Entrepreneurship – Going in the Right Direction?

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Abstract:

The literature on National Systems of Entrepreneurship (NSE) (Acs et al., 2014, 2016) has been claimed to be an important strand of entrepreneurship literature. This paper takes stock of system perspectives on entrepreneurship including recent re-vitalizations of the concept. Based on literature studies, the paper contributes with perspectives on whether the NSE literature is developing in a fruitful manner. It is found that the NSE literature has done a constructive effort to establish metrics that potentially can bring research forward towards a holistic understanding of the entrepreneurship process. However, deficiencies in the ‘new version’ of NSE are pointed out, and it is argued that major adjustments are needed in where the research is going. It is also proposed that more attention should be paid to implications for empirical analyses of the fact that entrepreneurship is a process going on in many different contexts and carried by multiple actors, and that solely focusing on output metrics of entrepreneurship misses the point. The implications from the analyses in the paper include not only renewed theoretical understanding, but also implications for entrepreneurship measurement, -teaching, and -policy.

# System views on entrepreneurship – going in the right direction?

## Introduction

It has been claimed (Acs et al., 2014, 2016) that the literature on National Systems of Entrepreneurship (NSE) is a burgeon, important strand of entrepreneurship literature with great potentials. In light of this it is of vital importance that this stream of entrepreneurship research is on the right track. With the point of departure in the original conceptualization of the NSE framework (Chang and Kozul-Wright, 1994) this paper takes stock of system perspectives on entrepreneurship including recent re-vitalisation of the concept (Acs et al., 2014, 2015, 2016). In doing so it also incorporates related fields such as ‘eco-system’ approaches to entrepreneurship (OECD, 2014, Malecki, 2011, Stam, 2015) and institutional theory applications (Bruton et al., 2010, Busenitz et al., 2000, Bowen and De Clercq, 2008). Based on literature studies, the paper contributes with perspectives on *whether the NSE literature is developing in a fruitful manner, and if not, what could be alternative avenues for this research?*

The NSE literature has done a constructive effort to establish metrics that potentially can bring research forward towards a holistic understanding of the entrepreneurship process. However, in this paper, two deficiencies in the ‘new version’ of NSE are emphasized and it is argued that major adjustments are needed in where the research is going and in its’ point of departure.

More specifically, it is argued here that the NSE research in its current version explicitly claim to be inspired by the National Systems of Innovation literature but it builds upon an un-nuanced interpretation of this literature; a literature that entails a range of different innovation systems, such as regional innovation systems (Cooke et al., 1997, Braczyk et al., 1998), technological innovation systems (Carlsson and Stankiewicz, 1995), and sectoral innovation systems (Malerba and Breschi, 1997, Malerba, 2002), not just NSI. Moreover, the innovation system concept can be understood in a broad or narrow sense (Lundvall, 1992). The NSE has adopted the NSI as point of departure but has not discussed that even within this literature there are different approaches. Common to these innovation system approaches is their strong links to institutional theory (North, 1990), however, the recent NSE literature seem to put relatively little weight on institutional explanations to entrepreneurship processes despite that a literature within this research tradition specifically explain the value of this perspective to entrepreneurship (Bruton et al., 2010). This has produced a micro-level, individualistic focus and, despite incorporating ‘attitude measures’ (Acs et al., 2014, p.480) a focus on output metrics in the operationalization of the ‘new NSE’ concept. Institutional contexts are handled through the use of ‘framework measures’ (ibid.). This way of approaching empirical analyses is not only far from the original conceptualization of NSE, but is indeed also pointing in the direction of less holistic explanations, contrary to its’ explicitly formulated intentions.

There is still a need to develop the operationalization of the theoretical base for better assessing the relevant metrics for entrepreneurship measurement. It is proposed in this paper that the functionalist approach to innovation system analyses (Bergek et al, 2008, 2010) may provide a more appropriate bridge between the theoretical foundation and relevant empirics. It is also proposed that more attention should be paid to implications for empirical analyses of the fact that entrepreneurship is a process and that solely focusing on output metrics of entrepreneurship misses the point.

As a start, the NSE literature is explained, both in its original form and the ‘new’ NSE literature. In section three follows a brief account of the innovation system literature to show what the new NSE literature is inspired from. The innovation system literature incorporates different types of actors and institutions (formal and informal) in the analysis of innovation and focuses on the links between the agents in the system. It is then, in section four, explained that large parts of the entrepreneurship literature questions a strong focus on the individual entrepreneur as carrier of entrepreneurial processes. This was strongly emphasized both in earlier entrepreneurship literature debating the relevance of identifying entrepreneurial traits (Gartner, 1988) and in related literature on intrapreneurship and entrepreneurial teams. The fifth section reflects upon explanations to the marked divide between entrepreneurship and innovation studies despite their apparent overlaps (Landström et al., 2015), and proposes a possible bridge and a suggestion for an adjusted research agenda, which is better in line with the NSI-tradition. Finally, the implications from the analyses in the paper include not only renewed theoretical understanding, but also implications for entrepreneurship measurement, -teaching, and -policy. These implications are unfolded in section six.

## National systems of entrepreneurship version 2.0

### The original starting point

When Chang and Kozul-Wright in 1994 introduced the concept of National Systems of Entrepreneurship (1994) (NSE) their purpose was to propose NSE as a framework for understanding and analyzing the interlinked roles of entrepreneurship and the institutional environment in which such processes takes place. Hence, the original conceptualization of NSE in the Chang and Kozul-Wright paper (1994) was referring to ‘..*institutional arrangements supporting continuous innovation through a network of public and private institutional linkages that encourage risk-taking, learning, imitating and experimenting and can manage the destructive components of entrepreneurship*...’ (pp.864-865). The authors claim that incorporating entrepreneurship in the analysis allow them to move beyond the traditional state versus market debate and instead have more focus on institutional diversity and transformation of economic routines.

As an illustration, they do a cross-country comparison (South Korea and Sweden) with respect to explaining the economic evolution of these two countries (and generally to explain the role of entrepreneurship (including the entrepreneurial state) in economic development). They approached this by going beyond the simple comparison of start-up rates and other limited, specific indicators for entrepreneurship activities centered on the actions of individuals. Contrary, they took the point of departure in the aggregate, national-level factors that shape economic evolution on a micro-level of aggregation.

Another important feature of their contribution is that their perception of entrepreneurship is not narrowly confined to the actions of individuals pursuing start-up of new, independent ventures. Beyond doubt the majority of entrepreneurial processes in any society take place within already established firms and organisations, private and public. Likewise, Chang and Kozul-Wright include firms as important carriers of entrepreneurial processes. But additionally, they point out that the state may be an important player, not just by providing policy frameworks conducive for entrepreneurship but indeed also by actively engaging in giving directions for these processes, much in line with what has recently been proposed by Mazzucato (2013, 2016). In section 5 we return to the approach of Mazzucato and relate it to the entrepreneurship aspects and policy implications hereof.

The Chang and Kozul-Wright paper (1994) was mentioned above as a primer for later development of NSE approaches to entrepreneurship. In fact, these authors also were very conscious about the role of institutions in establishing an adequate flow of knowledge and capabilities between economic units and in reducing uncertainty in society. They emphasized that such institutions would in some cases have a formal character such as property rights, government contracts, technical information (their examples, p.863), but in other cases may be more tacit and open-ended. The latter type of institutions are often *‘…established through experience and embodied in a diversity of linkages and legacies which make up an industrial and technological heritage, skills profile and geographical distribution of productive assets’* (p.863). Accepting this point of departure for understanding entrepreneurship implies the importance of learning, social capabilities, and traditions for voice-exit (Hirshman, 1970), loyalty and trust. Exactly the totality of institutional arrangements, formal and informal, that support continuous innovation by way of private and public institutional linkages, and that can balance to encourage learning, imitation and experimentation while at the same time manage side-effects from creative construction, is the essence of NSE in the minds of Chang and Kozul-Wright (1994). In section four I therefore elaborate on the role of institutions in entrepreneurship.

### A ‘new’ version of NSE

The ‘new’ version of NSE is first and foremost associated with recent work by Zoltan Acs and collegues (Acs et al., 2014, 2015, 2016). Their point of departure is the fact that entrepreneurship studies have mainly focused on the individual and innovation studies are focused on institutions and context, but overlooks individual agency. The entrepreneurship literature has broadly, they claim, ignored the context, which means that the literature has failed to incorporate the impact of the context on who decides to start new ventures, what type of venture is started, what strategies firms pursue, and what comes out of these processes (Acs et al., 2016). This is a relevant critique and point of departure for a new research agenda.

The empirical studies using the NSE approach are naturally, due to the only recent re-vitalization of the literature, limited in numbers, and some (Acs et al., 2014) have primarily been about establishing adequate data sources and indices (such as GEDI – Global Entrepreneurship and Development Indices, Acs et al., 2013, 2014, Lafuente et al., 2015). The GEM data have been the primary foundation for these discussions and the aggregation level has been the nation. At the same time, the authors believe that the …*’resource allocation system (is) driven by individual-level opportunity pursuit through the creation of new ventures*’ (Acs et al., 2016, p.1). Although it is recognized that entrepreneurship research has mistakenly ignored the impact of the context it is in their approach still individual action which is at the heart of economic evolution. Hence, it is pointed out that a pure count of the number of firms or start-ups in an economy or of the opportunities in the economy would not explain very much about the functioning of the entrepreneurship system. Rather it is how entrepreneurs get access to resources and transform these into productive use and pursuit of opportunities, which constitutes the entrepreneurial system (Acs et al., 2014). But again, it is individual choice variables that drive the allocation processes[[1]](#footnote-1).

By establishing a system for measuring entrepreneurship at the country level they see a bridge between the two types of literature. Essentially, the GEDI system (Global and Entrepreneurship and Development Index) is supposed to measure the entrepreneurship activities at a national level, but it is also claimed that this measurement reflects the institutional context in which entrepreneurship unfolds. Using the GEM data and other data sources such as World Economic Forum, the authors find that entrepreneurship is reflected in the broad categories of output measures, attitude measures, and framework measures (Acs et al., 2014). They propose that composite indices of 15 variables provide a basis for cross-country comparisons. These variables are Opportunity Perception, Startup skills, risk acceptance, networking, cultural support, opportunity startup, gender, technology sector, quality of human resources, competition, product innovation, process innovation, high growth, internationalization, risk capital. In summary, the NSE literature has made important progress in pointing to the need for variables at different levels of aggregation and different stages of the entrepreneurial processes. However, the reference to innovation system thinking, institutions, and the relevant actors in the processes are rather narrow as will be explained in section 3.

### Entrepreneurial eco-systems and other related literature

A related literature talks about ‘entrepreneurial eco-systems’ (Stam, 2015, OECD, 2014). As in the NSE literature the individual entrepreneur is in the core of this approach, but it emphasize that the context in which entrepreneurs operate is decisive especially for high growth oriented entrepreneurs. Policy implications are that for providing a conducive environment for high growth entrepreneurial action it is important to take a holistic approach, which means to incorporate not only the entrepreneurs but also their resource providers, and the networks that entrepreneurs leverage. Intervention should, though, be based upon a more elaborate data than we have today in order to identify strengths and weaknesses of systems (OECD, 2014). This literature has elements from the literature on regional innovation systems, cluster studies, and literature on learning regions but is more explicit about the role of the entrepreneur[[2]](#footnote-2). As discussed in the following section the inspiration from innovation systems thinking may indeed be different depending on how this literature is read and used.

## National systems of innovation – the core and emphasis on interaction and institutions

The innovation system literature (Lundvall, 1992, Nelson, 1993, Niosi et al., 1993, Edquist, 1997, Cooke, 2001) incorporates different types of actors and institutions (formal and informal) in the analysis of innovation and focuses on the links between the agents in the system. Innovation, which is often defined in terms of new products, processes or organisation, lies at the centre of the analysis, and the primary carrier of innovation is the firm. A branch of this literature talks about ‘technological innovation systems’. In this literature (Carlsson and Stankiewich, 1995, Hekkert et al., 2007) the focus is more on the single technologies and how the technologies evolve over time and is shaped in an interaction between knowledge generating and knowledge diffusion institutions. Other parts of the innovation system research has geographical scope as defining the perspective (Braczyk et al., 1998, Cooke et al., 1997) or is focused on a sector (Malerba, 2002, Malerba and Breschi, 1997).

This literature incorporates the impact of the national or regional context on the innovation activities, and innovation is considered a result of a collaborative effort. Technological innovation takes place in an interactive learning process between various actors at all levels in the economy (Lundvall, 1992) and increasingly so (Contractor and Lorange, 2002). Moreover, multiple sources of information and pluralistic patterns of collaboration seem to be the rule rather than the exception. The data from the Community Innovation Survey (CIS) have been used to demonstrate that firms often find their sources of inspiration for innovation from other organisations, and that they find these sources of inspiration in a multitude rather than with a single external partner (Smith, 2001, Tether, 2002). Likewise, work on innovation systems done at the OECD (1999), revealed that there is in fact a considerable variation between national innovation systems and industries in terms of the extent to which firms interact with different collaboration partners, and in terms of whether collaboration is pursued with domestic or international partners. Exactly these interactions constitute a large part of what is meant by ‘systemic’ innovation. The innovation process depends on information and links in the system. In turn, such links are heavily influenced by the level of trust, norms for collaboration, in brief institutions in society. Therefore, the approach is deeply rooted in the belief that innovation is an interactive, institutionally embedded process where agents and organizations communicate, co-operate, and establish long-term relationships.

Through three decades of research and policy making in the national innovation system tradition it is clear, though, that differences within the broad family of innovation system approaches concerns not only the perspectives regarding geographical boundaries, technologies or sectors, but indeed also there are differences in the emphasis and interpretation of institutions (Edquist and Johnson, 1997). What has become known as a US-based innovation system approach has more emphasis on formal institutions and the science and technology system, whereas the ‘Aalborg-model’ of innovation systems (Lundvall, 1999, 2007) is more distant to the triple helix models and more in line with institutional theory[[3]](#footnote-3).

Invariant of the selected analytical level, interaction between different types of agents is much emphasized and deeply rooted in the innovation system approach. Through interaction, the knowledge frontiers of society as a whole can be expanded, and the knowledge base of the firms involved in innovation collaboration can be enhanced. As mentioned, the firm is the main actor in this literature. The entrepreneur and entrepreneurial processes have been remarkable absent in systems of innovation analyses. However, many of the insights from this literature regarding e.g. the impact of the institutional environment and the importance of networks, knowledge, and interaction are equally relevant to entrepreneurship and have indeed been part of some entrepreneurship studies. For example, Stuart and Sorenson (2003) find that social relationships play a key role in mobilising resources necessary for the process of creating firms and discovering new opportunities. The same authors (Sorenson and Stuart, 2001) also maintain that the knowledge and creativity embedded in people, in a region and their local networks, render more start-ups in a region (Soh and Roberts, 2003).

The innovation system studies but indeed also the just-mentioned sociology inspired studies form a point of departure to a discussion on whether the earlier trajectories of entrepreneurship research point in a direction compatible with where the NSE version 2.0 is leading us.

## Entrepreneurship – the individual and other carriers of entrepreneurial processes

A huge research tradition on the personality traits and other characteristics of the individual entrepreneur has, despite recent interest in the composition and behavior of teams, been part of the explanation why there is still a strong focus upon the individual in entrepreneurship research. As a response, entrepreneurship researchers have, rhetorically, posed questions like ‘Who is an entpreneur? Is the wrong question’ (Gartner, 1988), as well as questioning why entrepreneurship is not an evolutionary science? (Aldrich and Fiol, 1994). It has also been prominent in the debate that entrepreneurship processes may be initiated in a ‘garage start-up’ manner but is clearly a very interactive process that continuously incorporate signals from the customers in the market and take in resources from stakeholders (Sarasvathy, 2008). Even going back to the Schumpeter heritage the Schumpeter Mark I entrepreneur is often portrayed as an individual who take independent action but the Mark II entrepreneur is contrary embedded in teams and R&D labs in large firms illustrating the strong interactive character of entrepreneurial processes.

If entrepreneurship studies are intellectually embedded in Schumpeter Mark I, focusing on the individual entrepreneur, and innovation studies more inclined to subscribe to the Mark II model, focusing on firms and R&D institutions, it is important to remember that both branches of research, and both types of processes (entrepreneurship and innovation) have developed immensely since the formulation of Schumpeter’s thoughts. As indicated above, the complexity of these processes and in which actors are involved in them has changed substantially. Not only individuals and firms pursue innovation and entrepreneurship, often a multiple of actors are involved, including both public and private actors, often in a partnership. Therefore, whereas regulations and the state has previously been regarded as obstacles for entrepreneurship it is today relevant to talk about the state as one of the carriers of entrepreneurial processes. This has been explicit in the debate on ‘The entrepreneurial state’.

The debate on the entrepreneurial state illustrates two major points. One is that even when the building of large, successful businesses seems to be the result of individual, entrepreneurial action, then closer scrutiny of the funding and origin of underlying technologies often shows that governments, not private businesses, provided the development of the core technologies used in commercial businesses[[4]](#footnote-4). Mazzucato mentions examples such as funding of Arpanet, prior to the internet, and the core technologies used by Apple Computer (2013). The second point is that entrepreneurial action can be pursued by other actors than private individuals. The concept of the entrepreneurial state relates not only to the fact that the state can fund development of core technologies but that the state has the opportunity to give directions for technological development. This can be pursued by ‘mission-oriented policies, exemplified by putting a man on the moon, which involved a wide range of sectors and engagement of both public and private actors and furthermore rendered a wide range of new technological achievements, many of which in turn were used in commercial products and proceses. Such initiatives provide directions of change by deliberately picking prioritized areas of intervention and investment (Mazzucato, 2013). What is important in this connection is that missions are achieved only when the public and private sectors work together on equal terms and roles. Historically successful cases of providing directionality did not came about in a top-down manner, rather by way of a decentralized group of public agencies (ibid., 2016). This (and the widespread use of public-private partnerships generally) illustrates that the carrier of entrepreneurial processes is not necessarily an individual who independently spot opportunities and try to pursue these opportunities. This is but a small part of entrepreneurship. In reality important actors range from these garage-startup-type entrepreneurs to public-private consortia doing large-scale, mission-oriented development project aimed at societal challenges.

The broadening of the range of ‘entrepreneurs’ naturally has a bearing on what the relevant context is for entrepreneurial processes, cf. the discussion above in section three. Directionality can be very tangible and explicit but whether mission-oriented policies will succeed can easily rely on much more implicit factors. As mentioned above, the innovation system perspective, especially in the ‘broad’ sense, point to the importance of (informal) institutions and explicitly refer to North and other authors in the tradition of institutional theory. In fact, discussions in the literature on the development trajectories of entrepreneurship theory likewise involved how institutional theory could enrich entrepreneurship theory (Bruton et al., 2010, Phan, 2004, Aldrich and Fiol, 1994).

More specifically, although institutional theory encompass a broad range of disciplines (sociology, organizational theory, political science, economics) the classification by Scott (2007) depict institutional forces as three pillars; the regulative, normative, and cognitive pillar. Applications of institutional theories to entrepreneurship have been used for only two decades to explain differences across countries in entrepreneurship rates and –behavior, some of which use the Scott classification. Institutions can be formal or informal. Formal institutions refer to the laws, regulations, contracts, property rights etc. and informal institutions the norms, values, culture and attitudes in society.

Importantly there is a relationship between the formal and informal institutions as the informal institutions impact how formal institutions functions (North, 1990, Bruton et al., 2010, Busenitz et al., 2000, Bowen and De Clercq, 2008). As also noted by Bruton et al. (2010) *‘Informal ties and relational governance fill in the ‘institutional voids’ resulting from an inadequate formal institutional infrastructure’* (p.426). The Kirzner entrepreneur may act in a competitive environment optimizing the use of information to create markets (Kirzner, 1973, 1997) but formal and informal institutions form the regulatory framework and norms for trade to at all take place. This applies to both a national and individual level of aggregation (Stenholm et al., 2015).

In sum, this section emphasized that even when individual action is the primary driver of entrepreneuship it is shaped by institutions but also that carriers of entrepreneurial processes are more than just individuals and firms.

## Entrepreneurship and innovation studies – two distinct fields of study and a possible bridge

The NSE literature attempts to bridge insights from innovation studies and entrepreneurship research. The literature on entrepreneurship and innovation systems should at first sight make up an easy fusion. The two concepts are often used together, even interchangeable in some discussions. Similar goes for academic journals that often has both words in their title (for example Journal of Innovation and Entrepreneurship; Journal of Entrepreneurship, Management and Innovation; The International Journal of Entrepreneurship and Innovation; International Journal of Entrepreneurship and Innovation Management; International Journal of Knowledge, Innovation & Entrepreneurship).Moreover, the work of Joseph Schumpeter (1934) is a key reference point for both entrepreneurship research and innovation studies.

Despite the apparent close links between the concepts research has shown that in fact the areas of research are rather distinct (Landström et al. 2015, Gartner et al. 2006). The former authors even maintain that the two fields are rather developing away from each other than converging.

There may be several reasons why these two research traditions are different. An important one is that the unit of analysis has been different. Entrepreneurship research has focused upon the entrepreneur and the (startup) firm, regardless of the activities of the firm. Exactly the activities, innovations, have been in the center of analysis within the innovation studies. These activities may not necessarily be related to the boundaries of the firm. Another reason is the intellectual heritage as explained above.

In current literature on NSE we see an uncritical adoption of the NSI approach with little reflection of whether this is an appropriate framework. The NSI literature is in the NSE work by Acs and colleagues criticized for ignoring the individual entrepreneur as a key actor, something that is advocated as guiding how the system perspectives on NSE should be analysed. On the other hand, NIS approaches have been criticized for ignoring agency (Hung and Whittington, 2011, Acs et al., 2016). However, within innovation system thinking a family of different approaches uses similar points of departure but have different units of analysis. Hence, there are wide differences between TIS, RIS, Sectorial innovation systems, and even within NSI thinking there are differences between the uses of the approach. Recognizing that (cf. section 4) entrepreneurship is a process it is suggested here that the functionalistic approach to innovation systems might constitute a more expedient reference point for the development of a NSE perspective. The functionalistic approach is associated with work by Carlsson and Jacobsson (1997) and Bergek et al. (2008, 2010). It explains that gearing innovation systems to effectiveness requires focus on the system weaknesses and the functions the systems fulfill. Specifically, weaknesses may be infrastructure, how markets function, interaction problems (lack of connectivity), complementarity problems (lack of complementary competences in the system), institutional problems, directional problems (search, lack of collective priorities) (Bergek et al., 2010). Although the functionalistic approach to innovation systems primarily talk about policy makers as the actor who addresses the weaknesses with policies on a system level then the weaknesses in the system are also dealt with by the firms and entrepreneurs who are primary carriers of the change processes. This literature also talk about sectorial and technological systems and that action towards different technological systems require additional, complementary actions depending on the specificities of the technologies involved. It is, for example, recognized that many of the system weaknesses (lack of co-ordination, financing, information) could be addressed by system actors since they are closer to the relevant activities. This, however, many constitute a major obstacle that requires policy makers to balance interfering in the market and providing incentives for market actors to behave in a ‘system conscious way’ (Bergek, 2010). In much the same vein, it should be considered how to apply this approach to a fruitful version of entrepreneurship systems. Entrepreneurship is a process/function, and can be envisaged at a system level as it is highly context (technology) dependent. But the underlying micro-level processes need to be incentivized (both for private firms and public sector organisations) and facilitated for systems to work. Hence, many of the basic elements of the functionalistic approach are applicable to entrepreneurship systems.

## Conclusions and implications for measurement, teaching and policy

This paper has primarily focused on the implications for research and where research is possibly going. It was found that the NSE research in its current version has made important progress but builds upon an un-nuanced interpretation of the NSI literature. The innovation system concept can be understood in a broad or narrow sense (Lundvall (ed.), 1992). The NSI approach have strong links to institutional theory, however, the recent NSE literature put relatively little weight on institutional explanations to entrepreneurship processes causing a micro-level, individualistic focus and a focus on output metrics in the operationalization of the ‘new NSE’ concept. Institutional contexts are purely ‘framework measures’ in this approach. The ‘new’ NSE is not only far from the original conceptualization but also points towards less holistic explanations, contrary to its’ explicitly formulated intentions.

It was also pointed to that entrepreneurship is a ubiquitous process carried by multiple actors and governed by informal institutions. This approach has wider implications as explained below.

#### Measurement

Innovation system studies have struggled to come up with adequate indicators for the rather different types of factors claimed to influence the innovation activities in society. The Oslo Manual (OECD, 2005), NESTI, and several other internationally concerted actions have been instrumental in progressing empirical understanding of innovation systems. The majority of studies have, nevertheless, been partial and focused on a narrow aspect of the innovation system despite recognizing the importance of a holistic approach. The question is if current approaches to enrich the entrepreneurship literature are doing the same mistakes, and if so, what could be a more appropriate way forward? The problem raised here: ‘How should the total system of entrepreneurial activities be measured and described?’ is probably largely unsolvable because our statistical system is geared towards measuring inputs and outputs whereas processes are difficult to capture with our current statistical instruments.

This is not to say that we should not use and develop entrepreneurship indicators. But we should be aware of the limitations in using aggregated output indicators only (as was the primary approach in the original Chang and Kozul-Wright 1994 approach – the present paper does not suggest that their approach was more fruitful than the GEDI/NSE-approach, and that we should go back to only focusing on macro-level indicators. It is only suggesting that it came prior to the NSE approach, therefore the asterisks in ‘new’). Accepting that entrepreneurship is a generic, ubiquitous process implies that our attention ought to be also at the inputs and intermediate outcomes of the process. Aggregate statistics might reflect the outcome of the underlying processes but does not necessarily measure entrepreneurship as such.

#### Entrepreneurship teaching

With the point of departure in a conceptualization of entrepreneurial processes as above there are also implications for how we teach entrepreneurship. Throughout universities there has been a wave of establishing entrepreneurship courses and formulating objectives to offer entrepreneurship teaching to a still larger share of students. It can be debated if it is time to roll back this wave and stop expanding separate, special entrepreneurship courses. Instead these courses should perhaps be replaced and/or complemented with incorporating entrepreneurial elements in all subjects taught at universities. When entrepreneurial processes are generic, ubiquitous processes they could be argued to be necessary parts of a wide range of skills. As it is formulated by DeCarolis (2016): ‘We Are All Entrepreneurs: It's A Mindset, Not a Business Model’.

#### Policy implications

The NSE literature and the NSI literature alike point to that rather than market failure, policies should address system failures that alleviate system-level deficiencies and bottlenecks (Acs et al., 2016, Lenihan, 2011). Innovation system thinking implies that traditional market failure approaches to policy has been supplemented, and in some cases replaced by, policies aimed at alleviating system failures. System failures may be failures in capabilities, institutions, frameworks or networks (Arnold, 2004, Woolthuis et al., 2005). For example, network failures may be inadequate interactions and links between key agents in the innovation system. Thus, they may be inadequate frequencies of linkages, poor quality of linkages, or lock-in problems. The policy approach following this is to remove obstacles for efficient and effective exchanges of economically useful knowledge for entrepreneurship and innovation.

Mazzucato (2013, 2016) has a different take on this. In her perspective the strong focus on fixing market failures or system failures as a rationale for policy has led to a biased view of the public sector as only facilitating change, regulate, and fix problems, rather than the role of public policy as guiding change, creating markets, and developing general purpose technologies such as the internet and nanotechnology. Related, a skeptic attitude has developed regarding the abilities of the public sector to take lead in transformation processes through investments and risk-taking. In turn, this has limited the investments the public sector makes in its internal competences and organisations in fulfilling exactly this task.

Even if agreement is established about objectives of more and better links between elements in the innovation system there is no uniform, best possible set-up of a national innovation system in any country (as implicitly presumed in the GEDI framework of the NSE literature). This has led to some frustration among policy makers, because quantitative, international comparisons of national innovation systems do not produce strong, clear policy recommendations. Only when supplemented with more careful, holistic studies of the functioning of the national innovation system it is possible to place such quantitative indicators in the right perspective. Perhaps even more frustrating is that if we should place more emphasis on ‘throughput indicators’ – the measurement of intermediate steps between input and output – we would have to accept less rigid correlations between input and outcome. For policy this implies that evaluations of policies addressing system failures inherently will be less rigid and precise in specifying tangible outcomes and causal effects. The question is if policy makers, in our time, are ready to accept this?

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1. A very similar approach was developed by Baker et al. (2005). As the title of their paper indicates (A framework for comparing entrepreneurship processes across nations) the basic purpose was to present a framework that could be used for comparing entrepreneurship processes across nations, and in content their paper is very similar to the work of Acs et al. For example, they point to the consequences of ignoring the context of entrepreneurship processes and to focus too much on the individual level, and they point to the need to incorporate institutional factors in the framework. [↑](#footnote-ref-1)
2. A number of studies within e.g. the cluster literature do, though, introduce the entrepreneur as a key driver of the creation and dynamics of clusters (e.g. Feldman et al., 2005, Feldman and Francis, 2006, Christensen and Stoerring, 2011). [↑](#footnote-ref-2)
3. See Rakas and Hain, 2016 for a bibliometric analysis of recent developments in innovation system research traditions. [↑](#footnote-ref-3)
4. It is a related point in this approach that because the state provides funding for both successes and failures there is no reason why the state should not have a share of the upside and behave to a larger extent similar to as in a venture capital model. In the current paradigm the public sector bear risks and pay for failures but do not harvest proceeds from successes. [↑](#footnote-ref-4)