

The Dynamisms of Entrepreneurial Motivation: A Case of Spin-off Formation by Academics operating in a Resource Constrained Environment

1. Introduction

In recent years, there has been increasing interest towards the investigation of what motivates academics to engage in entrepreneurial endeavour (Jones-Evans, 1997). Academic entrepreneurial motivations identified in these previous research suggests that academics are driven by attractive personal and/or contextual reasons that are supportive of entrepreneurial engagements; few of such motives are desire for novelty and wealth (Franklin et al., 2001), a need to make use of/commercialise technical expertise (Otto, 1999), a need for independence and control (Oakey, 2003), a high level of innovation in the surrounding region (Wright et al., 2004) and university policy towards the encouragement of academic entrepreneurial activity (Van Dierdonck and Debackere, 1988).

Most of these previous studies are conducted in developed nations, which are relatively rich in terms of resources that foster innovation and entrepreneurship (World Bank, 2010). However, far too little attention has been paid to understand the motivations of academic entrepreneurs operating in resource constrained environments. These less favourable environments are broadly characterised by high levels of resource scarcities that involve shortage of skills (Alexander and Andenas, 2008, Griffith-Jones et al., 2003), finance (United Nations Human Settlements Programme, 2005), infrastructure, technology (World Bank, 2010) and institutions (Claude and Weston, 2006) necessary for innovation and entrepreneurship.

Interestingly, some previous studies have shown that academics operating in environments that lack those conducive personal and contextual circumstances also demonstrate a high level of entrepreneurial behaviour (De Silva et al., 2012). Erdis and Varga (2009) argue that, in these constrained environments, the motivation of academic entrepreneurs is critical to induce entrepreneurship. Hence, this paper intends to contribute to fill this gap in our knowledge by investigating the motivations of academic entrepreneurs operating in resource constrained environments.

2. The Motivations of Academic Entrepreneurs

In order to investigate academic entrepreneurial motivations, defining an academic entrepreneur is considered a prerequisite as there is no consensus in the literature in relation to this definition. While this term has mostly been used in a focused manner to illustrate academic engagements in the formation of spin-off companies, some studies have used it to represent a much broader spectrum of knowledge-transfer activities (Jones-Evans and Klofsten, 2000, D'Este and Perkmann 2011). For the purpose of this research, academic entrepreneur is defined as a university academic who has engaged in the formation of at least one spin-off company (Radosevich, 1995, Samson and Gurdon, 1993, Daniels and Hofer, 1993). This definition narrows down entrepreneurial engagements to a specific type, which is vital to compare and contrast the findings with similar previous research conducted in resource rich environments. Furthermore, this definition enables drawing on the general entrepreneurship literature to develop a theoretical context for this study since spin-off formation by an academic is more or less similar to start-up company creation by a general entrepreneur. As the academic entrepreneurship literature lacks emphasis on the contextual variations of entrepreneurial motivations, the use of the general entrepreneurship literature is needed to enrich theoretical arguments.

Previous studies have categorised entrepreneurial motives into two groups; namely, 'pull' and 'push'. 'Push' motives/factors¹ are the elements of necessity which encourage entrepreneurial activity as a means of overcoming constrained circumstances. In contrast, 'pull' motives/factors are the positive reasons why someone decides to be entrepreneurial (Gilad and Levine, 1986). Relevant 'push' and 'pull' motives/factors, identified in the entrepreneurship and academic entrepreneurship literature, are listed in Table 1.

¹ The terms 'motives' and 'factors' are interchangeably used in this research

Table 1: Pull and Push Motives of Academic Entrepreneurs

Pull Motives
1. In order to achieve career development (McClelland, 1961, Greenbank, 2001)
2. In order to acquire new knowledge and skills (D'Este et al., 2010, Howell et al., 1998, Meyer-Krahmer and Schmock, 1998)
3. In order to capitalise on the opportunity perceived by academic by him/herself (Basu (Basu and Goswami, 1999, Shane and Venkataraman, 2000)
4. In order to capitalise on the opportunity perceived by the university (Basu and Goswami, 1999, Shane and Venkataraman, 2000)
5. In order to provide a service to students (e.g. lab equipments industry placements employment opportunities and other opportunities for students etc) (Van Dierdonck and Debackere, 1988, Meyer-Krahmer and Schmock, 1998, Siegel et al., 2004)
6. In order to make use of industrial resources (D'Este et al., 2010, Howell et al., 1998, Meyer-Krahmer and Schmock, 1998)
7. Desire for wealth (Hisrich and Brush, 1986)
8. For personal satisfaction (e.g. associate with people outside the university, and independence, social status, challenge seeking nature etc) (Turnbull et al., 2001, Lumpkin and Dess, 1996, Barrow, 1993, Sexton and Bowman-Upton, 1985)
9. As result of role models (Dunn and Holtz-Eakin, 2000, Erdis and Varga, 2009)
10. Belief that it will not interfere with academic career (Ambos et al., 2008)

Push Motives
1. Insufficient income (Alstete, 2002, Tagiuri and Davis, 1992, Dunn and Holtz-Eakin, 2000, Shane et al., 2003, Basu and Goswami, 1999)
2. Job related dissatisfaction (Alstete, 2002)
3. Not having an industrial partner capable of commercializing the new product/technology (Eun et al., 2006)
5. Pressure for academics to engage in entrepreneurial activities (Van Dierdonck and Debackere, 1988)

Academic Entrepreneurial Motivation in a Resource Constrained Environment

Previous research, conducted in resource rich environments, argues that academic entrepreneurs are motivated by pull factors. For instance, Similor (1990), in a study of 23 technology-based spin-out companies from the university of Texas at Austin, concluded that academics are highly motivated by pull factors in comparison to push factors. Pull factors identified were the recognition of a market opportunity, a drive to try something new and a desire to put theory into practice. Insufficient income has been the only push factor found to be important, but university or job related dissatisfaction was not found to be of great significance. A similar research conducted in the UK has highlighted personal satisfaction and desire to increase personal wealth as pull factors that motivate academic entrepreneurs (Weatherston, 1995). Few other pull factors highlighted in previous research

are need to achieve career development (Greenbank, 2001), acquire new knowledge and skills (D'Este et al., 2010) et al., 2010(Howell et al., 1998, Meyer-Krahmer and Schmock, 1998), provide a service to students (Van Dierdonck and Debackere, 1988, Meyer-Krahmer and Schmock, 1998, Siegel et al., 2004) and use industrial resources (D'Este et al., 2010).

By linking motivations with contextual variations, Wright et al., (2004) have argued that spin-off formation in the Massachusetts Institute of Technology or the University of Stanford is motivated by pull factors due to the high level of innovation in the surrounding region, while it is often 'technology push' in an environment with less innovation and entrepreneurship. In the Global Entrepreneurship Monitor (GEM) project (2006), the majority of entrepreneurs who were motivated to capitalise on perceived business opportunities (which is a pull motive) were found in high income countries, while those who were motivated by necessity (which is a push motive) were found in middle or low income countries (Bosma and Harding, 2006). This was further supported by Acs (2006) who revealed that, the higher the economic development, the higher the ratio of opportunity to necessity entrepreneurs. In line with these previous studies, it is possible to argue that academic entrepreneurs operating in a resource constrained environment maybe motivated by push factors.

While the above mentioned studies tend to believe that motivations are 'static', the literature has also suggested that motivations may vary depending on the stage of the entrepreneurial process (Shane et al., 2003, Schjoedt and Shaver, 2007). Relating the context to changes in entrepreneurial motives, some authors in the general entrepreneurship literature have argued that, in extremely constrained environments, entrepreneurs are initially pushed to engage in entrepreneurial activities, but with the development of their business, motives gradually change towards pull (De Silva and Kodithuwakku, 2011, Rosa et al., 2006). By applying this to the academic entrepreneurship literature, it could be argued that academic entrepreneurs in resource constrained environments may be initially motivated by push motives, and later the significance of pull motives increases. Hence, it will be interesting to investigate whether the motivations of entrepreneurs dynamically change, which, to the knowledge of the authors, has rarely being investigated in the academic entrepreneurship literature.

Based on the theoretical context highlighted above, this study intends to make two contributions to the literature; it investigates the motivations of academic entrepreneurs

operating in resource constrained environments, and by doing this, it examines whether these motivations dynamically change over the entrepreneurial careers of academics.

3. Methodology

Sri Lanka was chosen as the location to represent a resource constrained environment. According to the classification of the World Bank, Sri Lanka is a lower middle income country with the GDP per capita of 2375 (current US \$) in 2010 (The World Bank, 2011). In terms of the world bank indicators Sri Lanka is placed in the 50th, 16th, 26th, and 55th (higher ranks indicate stronger resource status) percentile ranks with respect to financial, infrastructural, technological, and institutional resources respectively. Furthermore, Sri Lanka is among the nations with a very low level of support mechanisms and institutional frameworks for promoting university industry interactions (University Grant Commission of Sri Lanka, 2011). These facts illustrate the resource constrained environment in which Sri Lankan academics operate.

Mixed methods were adopted in a sequential manner (Fleiss and Zubin, 1969). Initially, an on-line survey was conducted, which was subsequently followed by an in-depth face to face interview phase. The main purpose of the online survey was twofold. First, the survey gathered data on the entrepreneurial engagements of academics, which were used to identify academics who have engaged in spin-off formations and the progression of their entrepreneurial careers. Second, the survey collected quantitative data on the 'current' motivations of academic entrepreneurs. The purpose of interviews was to collect qualitative in-depth data on the 'current' academic entrepreneurial motivations as well as how motivations have been changed over the entrepreneurial careers of academics.

The academics in 13 universities in Sri Lanka (employing a total of 4215 academics as of the first of January 2009) (University Grant Commission of Sri Lanka, 2011) were considered the population of this study. A sample of academics for the on-line survey was selected using a cluster sampling technique. The unavailability of a list of elements in the population, as well as inability to cover all the universities during the in-depth interview phase led to decide to use this sampling technique. In order to reduce potential sampling errors this study selected a representative sample of universities (Arber, 2001) in terms of their age (Franklin et al.,

2001), location and size (Friedman and Silberman, 2003, Agrawal and Henderson, 2002). Accordingly, academics in 6 out of 13 universities were selected as the sample (N=1182).

In order to investigate changes in motivations over entrepreneurial careers it was required to identify the entrepreneurial processes of academics. The literature has argued that academic entrepreneurs initially carry out 'lesser entrepreneurial' activities, and then diversify into 'highly entrepreneurial' activities (Tijssen, 2006). This has been found to be prominent in resource constrained environments, since it is a strategy adopted by academics to extract value from limited opportunities (De Silva et al., 2012). Therefore, a list of seventeen entrepreneurial activities, categorised into three groups (i.e. teaching related activities, research related activities, and company creation) by de Silva et al (2012) (Table 2), was used as a framework to gather data needed to identify entrepreneurial processes.

In the on-line survey, academics were initially asked to state whether they have engaged in each academic entrepreneurial activity during the past five years. Subsequently, academics, who have engaged in spin-off formations, were requested to state the extent to which they were motivated by each push and pull factor listed in Table 1, on a rating scale of 1 to 4 (1= extremely low, 2=low, 3=high, 4= extremely high, N/A= not applicable). The use of a four point rating scale is justified by Bendig (1954), which revealed that there was no significant difference among 3 to 9 rating scales with respect to their reliability. Furthermore, the four point rating scale allowed avoiding a middle point, the use of which had been criticised since respondents generally have a higher tendency to select the middle point (particularly in Asian cultures) (Armstrong and Overton, 1977, Teddlie and Yu, 2007).

The rate of response of the online survey was 30% (358 responses in total). Out of them, 122 academics had engaged in spin-off formations and they were considered 'academic entrepreneurs' for the purpose of this research². From these 122 academic entrepreneurs, a sample of 35, which was a representative of their demographic characteristic (i.e. university, age, gender, and academic discipline), was selected for in-depth interviews.

² Non-response bias test (65) revealed that respondents do not differ significantly from non respondents with respect their universities $X^2(5, 1182) = 2.976$ $p=.704 > 0.05$, gender $X^2(1, 1182)= 3.674$ $p=.06>.05$, academic discipline $X^2(7, 1182)= 10.410$ $p=.167>.05$, and position $X^2(2, 1182)= 1.015$ $p=.602>.05$.

Table 2: Academic Entrepreneurial Activities

Teaching related A.E.A	Research related A.E.A	Company creation
(1) External teaching (2) Initiating the development of new degree programmes (3) Placing students as trainees in industry (4) Conducting seminars and training sessions for industry	(1) Working in the industry (research based) (2) Research based consultancy for industry through the university (3) Research based consultancy privately (but without forming a company) (4) Developing products or services with potential for commercialization. (5) Acquiring research funding from government, non-governmental or international bodies (those without collaborations with industry) (6) Collaborating with industry through joint research projects (7) Research related assistance to small business owners.	(1) Contributing to the formation of joint ventures in which university and industry are the joint partners (2) The formation of joint venture/(s) privately through collaborating with industry (3) Contributing to the formation of one or more new spin-off companies (4) Contributing to the establishment of university incubators and/or science parks (5) Contributing to the formation of university centres designed to carry out commercialization activities (6) The formation of your own company/(s)

Source: De Silva et al 2012

A.E.A – Academic Entrepreneurial Activities

During in-depth interviews, respondents were asked whether there was a sequence with respect to diversifying into three different types of entrepreneurial activities (i.e. teaching related activities, research related activities, and company creation). This sequence is believed to represent the entrepreneurial process of each entrepreneur. Thereby, respondents were asked to state how motives dynamically changed over this process. The motivations to diversify into each of the three types of entrepreneurial activities were considered major milestones of dynamisms in entrepreneurial motivations. The use of a qualitative data collection process to understand dynamisms has been a strategy successfully adopted in previous research (Rasmussen et al., 2011). Interviews were recorded and transcribed. Post coding was done with respect to different motives that encouraged them to diversify into, and continue carrying out, each type of entrepreneurial activity. Motives mentioned in Table 1 was used as a basis for post coding and additional motives mentioned by academic entrepreneurs were later added into the list of codes. NVivo was used for the analysis.

4. Results and Discussion

Data analysis suggested that an entrepreneurial engagement by a majority of academics was a process, where they had started their entrepreneurial careers by teaching related entrepreneurial activities, and then, diversified into research related entrepreneurial activities and company creation. As the term ‘diversifying’ implies, the engagement in company creation had not stopped academics carrying out teaching and research related entrepreneurial activities. Hence, they engaged in a portfolio of activities which comprises all three types of entrepreneurial activities. The following sections initially present the analysis on how their motivations vary along the entrepreneurial careers of diversifying into three different activities. This is followed by a discussion on their ‘current’ motives to carry out a portfolio of activities.

4.1. Dynamisms in Entrepreneurial Motivations

Data analysis on the dynamism of entrepreneurial motivation was structured around three critical points of the entrepreneurial process; namely, deciding to engage in teaching related academic entrepreneurial activities, to diversify into research related academic entrepreneurial activities and to diversify into company creation.

4.1.1. Dynamisms in Entrepreneurial Motive: Engaging in Teaching related Entrepreneurial Activities

Almost all of the respondents stated that they began their entrepreneurial careers by engaging in at least one out of four teaching related entrepreneurial activities; namely, external teaching, initiating the development of new degree programmes, placing students as trainees in industry, and conducting seminars and training sessions for industry. It was evident that teaching related entrepreneurial activity was initially motivated by push motives such as insufficient income, inadequate contacts with industry, a lack of knowledge and skills among students on applied aspects, and a low level of demand for their degree programmes etc. One academic entrepreneur stated:

‘I started engaging in external teaching since my salary was insufficient..... During my sabbatical leave period, I got experience abroad, and then, decided to introduce a new

course in the external degree programme.There was a gap in the education market in Sri Lanka with respect to the “X” subject area [i.e., academic discipline in which he received experience abroad], even though it was highly demanded by industry’

However, it was apparent that, over time, the significance of ‘pull’ factors increased. Such pull factors were a need for recognition/status, for personal satisfaction, to improve employment opportunities to students, and to make use of academic expertise etc. For example, one academic entrepreneur mentioned:

‘My engagement in external teaching was initially prompted by insufficient personal income. However, now I conduct external teaching as a service to students and for personal satisfaction since there is no expert in my discipline to conduct relevant classes. The current income I gain from external teaching is insignificant in comparison to my total income’

The above quotation illustrates that, with increased involvements in entrepreneurial activities, the significance of insufficient personal income, which was an initial ‘push’ motive, decreases, whereas that of ‘pull’ motives such as personal satisfaction and philanthropy increases.

Another academic entrepreneur explained this change in motivation:

‘I decided to conduct training and seminars to industry since I didn’t have contacts, which made it difficult for me to secure contracts [i.e. research related contracts] from industry. Therefore, I made a great effort to secure opportunities to conduct training and seminars to industry..... However, now I conduct these only if I’m invited by industry. The reasons for engagement now is to maintain contacts and for personal satisfaction’.

Based on the above discussion it was apparent that the engagement in teaching related entrepreneurial activities was initially motivated by push factors, but subsequently, the significance of ‘pull’ motives increased.

4.1.2. Dynamisms in Entrepreneurial Motivation: Diversify into Research related Entrepreneurial Activities

Interviews suggested that academics diversified their initial engagements in teaching related entrepreneurial activities into at least one research related entrepreneurial activity; namely, working in the industry (research based), carrying out research based consultancy for industry via their universities or privately (but without forming a company), developing products or services with potentials for commercialization, acquiring research funding from government, non-governmental or international bodies, collaborating with industry through joint research projects, and providing research related assistance to small business owners. Similar to teaching related activities, academic engagement in research related entrepreneurial activities was also found to be motivated initially by push factors, and lately, the significance of pull factors increased. Push factors that particularly motivated diversifying into research related entrepreneurial activities were inadequate research income, and a lack of resources in universities. For example, one academic entrepreneur explained how he was initially motivated by ‘push’ factors:

‘Since university lacks resources, I try to engage in joint research projects, so that I could make use of industrial resources. When preparing budgets for consultancy or other research projects, I try my level best to find ways to improve the resource status of the university’.

His engagement in research related entrepreneurial activities was initially motivated by a lack of resources in his university. The following quotations illustrate how motivations to engage in research related entrepreneurial activities had changed over time:

‘I decided to do consultancy since my income was not sufficient. My decision to apply for international funding was driven by a lack of funding received from my university to conduct research. I couldn’t at least recruit a research student. I wanted to develop my publication profile. I was successful in both consultancy and funding grants. After my initial successes, later funding applications were driven by my need to provide opportunities to students, to improve resource status of university, and to provide a service to the country/tax payers, in return for receiving free education’

'Two years back, I was promoted as a professor, So now I'm not pressurised to have publications, but I need to have funding to maintain my academic calibre.The motive for applying for consultancy also changed from insufficient income to need to improve my personal income, so that, I could have more savings for my children'.

It was apparent that his engagement in research related academic entrepreneurial activities was initially pushed by insufficient personal and research income. With the success achieved by these activities, some pull factors such as a need to provide benefits to students and a service to country, and a desire to improve resource status of his university were added. Lately he was mainly motivated by pull factors such as desire for wealth and for maintaining a high academic standard. The above analysis revealed that, while the some motives that encouraged involvements in research related entrepreneurial activities were somewhat different from those that encouraged engaging in teaching related academic entrepreneurial activities, the changes in motives were similar where both the types of involvements were initially motivated by push motives, and then, the influence of pull motives increased over time.

4.1.3. Dynamisms in Entrepreneurial Motivation: Diversify into Company Creation

In-depth interviews suggested that, in addition to carrying out teaching and research related entrepreneurial activities, academics also diversified into at least one activity categorised under company creation; namely, the formation of joint ventures or new spin-off companies. It was evident that academic engagement in company creation was initially motivated by push factors such as insufficient personal income, a lack of resources within universities, and delays occurred and difficulties encountered as a result of engaging in academic entrepreneurial activities via universities. For instance, one academic entrepreneur explained:

'University bureaucracy made it very difficult to be competitive when engaging in consultancy. Further, university rule doesn't support competitive bidding. Therefore, I with a group of my colleagues started a company to provide consultancy services. This arrangement had resulted in us receiving substantially higher personal income. I think that it is due to the effective and efficient service delivery'.

His motivation to establish a company was initially driven by a need to overcome university bureaucracies, which is a 'push' factor. Since university regulation in Sri Lanka doesn't allow forming profit oriented companies groups of academics privately established companies, some of which were located in university premises (by paying a rent). These companies acted as outreached arms of universities that successfully secured and carried out research and other types of consultancy projects by overcoming bureaucratic university system.

However, it was apparent that, unlike deciding to engage in teaching and research related entrepreneurial activities, push factors alone would not have motivated to form a company, had academic entrepreneurs not been motivated by strong pull factors. The recognition of opportunity, need to try something new, creativity, status, desire for wealth, personal satisfaction, and the sense of achievement were the pull factors that motivated them to form companies.

It was also evident that as a result of diversifying into company creation their motivations to carry out teaching and research related entrepreneurial activities also changed. For instance, one entrepreneur stated:

'Initially, most of the engagements [i.e., teaching and research related academic entrepreneurial activities] were due to insufficient income and a lack of resources in my university. After starting our company, motives [for engaging in teaching and research related academic entrepreneurial activities] changed. We were able to improve resource status of the university and to develop reputation and credibility in the industry. As a result, we received a lot of opportunities to engage in teaching and research related academic entrepreneurial activities and had resources in the university to capitalise on such opportunities.Sometimes, we provide services free for small scale entrepreneurs'

As illustrated in the above quotation after the company is formed, motivations to engage in teaching and research related entrepreneurial activities had been changed from push factors, such as insufficient personal income and university resources, to pull factors, such as need to capitalise on opportunities, to make use of resources, and for personal satisfaction. In a similar vein, another academic entrepreneur stated:

'I initially decided to engage in consultancy since I didn't have sufficient income. My decision to engage in joint research projects with industry was driven by not having adequate resources in the university to conduct research. Now I have a joint research lab and a privately owned company.....With the development of these activities [i.e. after the establishment and growth of companies], further engagement [i.e. in teaching and research related entrepreneurial activities] was driven by need to do something beyond publications and to bring more businesses...I also feel that now I receive high recognition'

The above quotation illustrates how push factors for carrying out research related entrepreneurial activities such as insufficient personal income and a lack of resources in universities were changed to pull factors such as status, creativity, and desire for commercial success and wealth as a result of the establishment and growth of a joint-research lab. Based on the above discussion, it is possible to state that while the change in motivations for company creation also followed the same pattern as teaching and research related entrepreneurial activities, the significance of pull motives for company creation was higher than other two types of activities. Furthermore, since company creation improved resource status of universities, it influenced a change in motivations to engage in teaching and research related entrepreneurial activities from push to pull.

4.2. The 'Current' Motivations of Academic Entrepreneurs

Since all the academics considered for this study have formed at least one spin-off company, on the basis of the above findings related to the dynamisms of their motivations, the majority of them should currently be motivated by 'pull' factors. In order to verify this, the data collected via the on-line survey on the extent to which academic entrepreneurs were currently motivated by each motive (1= extremely low, 2=low, 3=high, 4= extremely high) was compared and contrasted using an ANOVA test. The homogenous subsets of motivations were identified using a Tukey's Post-hoc test. As illustrated in Table 3, it was evident that academic entrepreneurs were significantly more motivated by 'pull' motives than 'push' motives. 'Need to achieve career development' ($M= 3.25, SD =0.73$), 'in order to acquire new knowledge and skills' ($M= 3.37, SD = 0.66$), 'need to provide benefits to students' ($M= 3.43, SD = 0.59$), and 'for personal satisfaction' ($M= 3.64, SD= 0.58$) were the highly rated 'pull' motives.

In-depth interviews revealed that, since resources were scarce in the environment, entrepreneurial engagement was essential to generate resources to carry out teaching and research, which was the reason why academics considered ‘a need to achieve career development’ and ‘providing benefits to students’ as highly influential motives. For instance, academic entrepreneurship enabled academics to overcome resource barriers, as a result of which, more opportunities and resources were available for them to engage in research activities. Similarly, it was evident that, since Sri Lankan universities lack resources for teaching (e.g. lab facilities, funding, and teaching aids etc), resources acquired through entrepreneurial activities (e.g. research based consultancy and joint-research labs with industry) were useful to improve the quality of teaching.

In depth interviews further suggested that conducting joint research with industry, working in industry (research based), and company creation were, to some extent, motivated by need to understand current trends and gaps in industry, and to acquire knowledge and skills relevant to application oriented research. In these instances, working with industry had resulted in sharing tacit knowledge. Since the opportunities to gain new knowledge in this constrained resource environment were limited, the significance of the exchange of knowledge via entrepreneurial engagements was vital. This was found to be the reason why they placed a high importance on the motive, ‘in order to acquire new knowledge and skills’. Furthermore, anecdotal evidence suggested that, since the entrepreneurial engagements of academics enabled universities to overcome resource barriers, entrepreneurs had relatively high social status than non-entrepreneurs. This seems to justify why academics considered ‘personal satisfaction’ as a highly influential motive.

Need to capitalise on self-perceived opportunities ($M= 3.22$, $SD= 0.63$) was also found to be a highly rated ‘pull’ factor by academic entrepreneurs. In-depth interviews revealed that, while the recognition of an opportunity by individuals was mandatory for all the entrepreneurial engagements, it was a major incentive when engaging in company creation and some research related academic entrepreneurial activities, such as acquiring funding, joint research, and consultancy.

Table 3: Motivations of Academic Entrepreneurs: Results

Motivation	N	Subset for alpha = 0.05						
		1	2	3	4	5	6	7
1. The pressure for academics to engage in entrepreneurial activities	100	2.04						
2. Job related dissatisfaction	94	2.10						
3. Not having an industrial partner capable of commercializing new product/technology	85		2.58					
4. The belief that entrepreneurial engagements will not interfere with academic career	93		2.80	2.80				
5. Insufficient income	98		2.84	2.84	2.84			
6. As a result of role model	96		2.86	2.86	2.86	2.86		
7. In order to capitalize on the opportunity perceived by universities	102		2.88	2.88	2.88	2.88		
8. In order to make use of industrial resources	101			3.09	3.09	3.09	3.09	
9. Desire for wealth	102			3.19	3.19	3.19	3.19	
10. In order to capitalize on self perceived opportunity by academic	100				3.22	3.22	3.22	
11. In order to achieve career development	102					3.25	3.25	3.25
12. In order to acquire new knowledge and skills	102						3.37	3.37
13. In order to provide benefits to students	102						3.43	3.43
14. For personal satisfaction	101							3.64
Sig.		1.00	.332	.050	.061	.051	.165	.053

Even though academic entrepreneurs in this resource constrained environment were highly motivated by pull factors these pull factors were found to be shaped by resource scarcities. For example, it was apparent that, due to high resource barriers, an entrepreneurial engagement was the major source that provided them with additional funding and physical resources. These resources were essential to achieve career development, acquire new knowledge and skills, provide benefits to students, and capitalise on perceived opportunities.

A desire for wealth ($M= 3.19$, $SD = 0.77$) has been ranked lower than previously discussed ‘pull’ motives. It was apparent that most of the research related activities carried out by entrepreneurs, except consultancy, did not generate high personal income. For example, they did not make extra income by working in industry since salary scales in most of these places were not different from universities. Furthermore, based on university rules, any engagement in funded projects did not bring additional income to academics, other than covering research related expenses. Hence, the carrying out of these activities was more motivated by a need to

pursue their research careers than desire for wealth. It was mainly company creation that had generated extra personal income.

‘Push’ motives such as ‘job related dissatisfaction’ ($M = 2.10$, $SD = 0.96$), ‘the pressure for academics to engage in entrepreneurial activities’ ($M = 2.04$, $SD = 0.83$), and ‘not having an industrial partner capable of commercializing new product/technology’ ($M = 2.58$, $SD = 0.98$) were lowly rated by academic entrepreneurs. In-depth interviews revealed that none of the universities in Sri Lanka had a clear university policy for academic entrepreneurship. Hence, there was no pressure from universities for academics to engage in entrepreneurial activities. Academic entrepreneurship was a result of the drive of individual academics. It was also apparent that while company creation was, to some extent, motivated by not having an industrial partner capable of commercializing new product/technology, it was not the main motive. Due to resource scarcities, company creation was mainly driven by a need to improve the financial and physical resources of individual academics and their universities.

The above discussion on ‘current’ motives suggested that academic entrepreneurs in this resource constrained environment were significantly more highly motivated by ‘pull’ motives than ‘push’ motives. Nevertheless, ‘pull’ motives were shaped by resource scarcities, since academic entrepreneurial engagements enabled overcoming resource barriers, which was needed to fulfil ‘pull’ motives.

5. Conclusions and Implications

This paper made two original contributions to the academic entrepreneurship literature; it discussed the motivations of academic entrepreneurs operating in a resource constrained environment, and in doing this, it also highlighted the dynamisms of motivations over their entrepreneurial careers. In this resource constrained environment, academic entrepreneurship was found to be a process starting from teaching related entrepreneurial activities, and then diversifying into research related entrepreneurial activities and company creation. When investigating the motivations of academic entrepreneurs, this paper studied how motives for engaging in these three entrepreneurial activities change over time. This approach of identifying dynamisms in motives along the entrepreneurial process of diversifying into different activities is novel to the academic entrepreneurship literature.

It was revealed that the engagements of academic entrepreneurs in each of the above three activities in this scarce resource environment is initially motivated by ‘push’ factors and over the development of their entrepreneurial careers the significance of ‘pull’ factors increases (Figure 1).

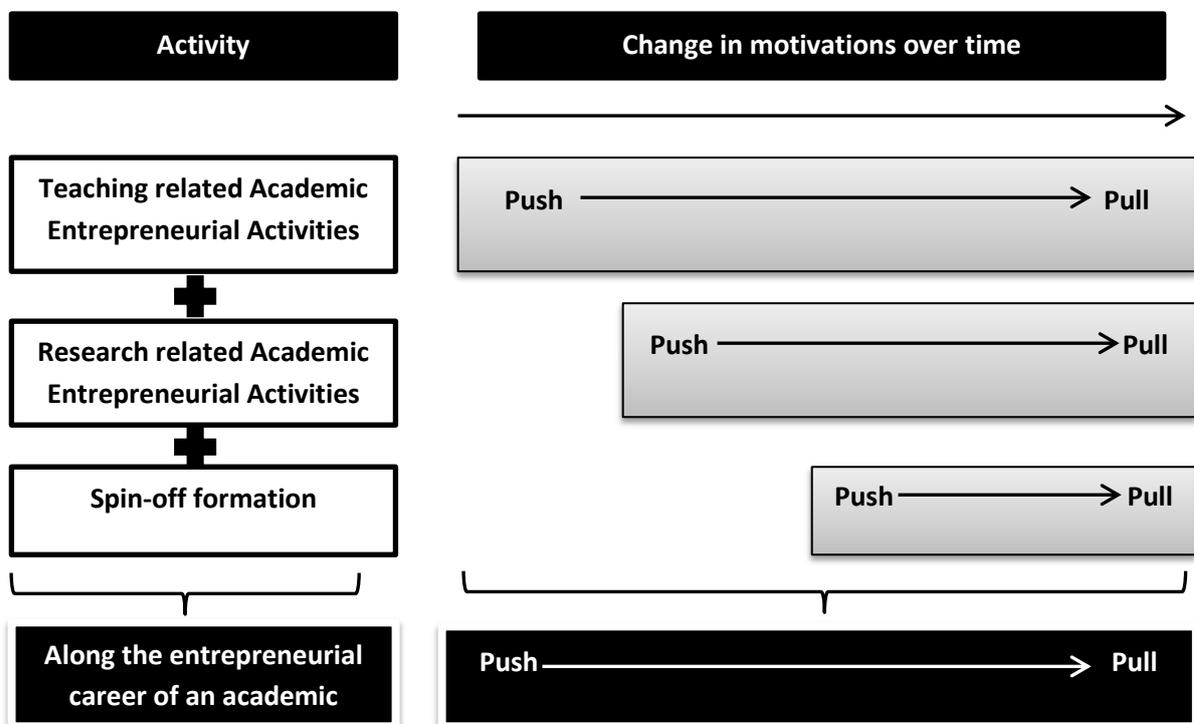


Figure 1: Dynamisms of entrepreneurial motivation in a resource constrained environment

This finding illustrated how academic entrepreneurial engagement in a resource constrained environment differs from that in a resource rich environment; previous studies, conducted in developed nations, argued that academic entrepreneurs are motivated by ‘pull’ factors. On the other hand, this change in motives from ‘push’ to ‘pull’ is in line with the dynamism in entrepreneurial motives discussed in the general entrepreneurship literature (Schjoedt and Shaver, 2007, De Silva and Kodithuwakku, 2011, Rosa et al., 2006), although the specific motives of academic entrepreneurs identified in this study is different from those of general entrepreneurs.

Push motives that especially encouraged the carrying out of teaching related entrepreneurial activities were ‘a low level of demand for degree programmes’, ‘a lack of contacts with, and reputation in, the industry’, as well as ‘inadequate knowledge and skills among students on applied aspects’. Similarly, push factors that particularly motivated diversifying into research related entrepreneurial activities were ‘inadequate research income’, and ‘a lack of resources in universities’. Push motives that encouraged diversifying into company creation were ‘need to overcome inefficient and inflexible university bureaucratic system’, and ‘not having an industrial partner to commercialise their innovations’. ‘Insufficient personal income’ was a strong push factor that motivated the engagement in any entrepreneurial activity. However, ‘job related dissatisfaction’ was not an important push motive, which also confirms the findings of Similor (1990).

While the decision to carry out each activity was initially motivated by ‘push’ factors, when the portfolio of activities was increased, the significance of ‘pull’ motives increased. Pull factors that were identified as important, regardless of the type of entrepreneurial activity, were ‘need to achieve career success’, ‘to capitalize on opportunities perceived by colleagues’, and ‘to provide benefits to students (industry placements, and job opportunities etc)’. Interestingly, these were also recognised as important pull motives in studies conducted in developed countries (Basu and Goswami, 1999, Van Dierdonck and Debackere, 1988) (Meyer-Krahmer and Schmock, 1998, Siegel et al., 2004). Despite this similarity it was evident that, in a resource constrained environment, these pull motives were shaped by resource scarcities. For example, it was apparent that, since resources were scarce, entrepreneurial engagement was the only option they had to secure financial and physical resources needed to carry out teaching and research activities necessary for career development. Similarly, even though capitalising on opportunities perceived by colleagues is

a pull factor, it was found to be shaped by the fact that this environment has limited opportunities (which is a push motive), which drives the need for collective capitalisation to reap mutual benefits. Hence, another original contribution of this study is the illustration of how pull motives in a resource constrained environment are shaped by push motives.

Additionally, diversifying into company creation was motivated by some specific pull factors, such as 'need to acquire new knowledge and skills', 'in order to capitalise on self-perceived opportunities', 'the belief that an engagement in academic entrepreneurial activities will not interfere with their academic careers', 'desire for wealth', and 'for personal satisfaction'. Although pull factors that motivated the engagement in teaching and research related entrepreneurial activities gradually became important, pull factors that encouraged company creation immediately followed push factors. This finding is in agreement with Jones-Evans (1997) who has stated that, when academics are motivated only by a need to earn additional income, they tend to engage in consultancy rather than face the hazard of company creation.

Although previous studies (D'Este et al., 2010, Howell et al., 1998, Meyer-Krahmer and Schmock, 1998) have highlighted 'a need to make use of industrial resources' as an important pull factor, it was not found to be a significant motive in this resource constrained environment. This has been mainly due to lower research and development investments made by industry in a resource constrained environment as opposed to more developed nations.

In addition to the theoretical contributions highlighted above, this paper also provides some practical implications for academics, universities, and policy makers, particularly for those operating in resource constrained environments. As the majority of academics in this context use entrepreneurial engagements to overcome barriers to achieving personal and academic goals (e.g. earning personal and research income, improving university resources, personal satisfaction etc), academics in resource constrained environments (e.g. developing low income countries) should use entrepreneurial engagement as a strategy to overcome resource barriers. Moreover, not only company creation, but also teaching and research related academic entrepreneurial engagements were used by academics to pursue these personal and academic goals, which is also in line with the findings of research conducted in developed countries (D'Este and Perkmann 2011). This emphasises the importance of recognising the

value of teaching and research related academic entrepreneurial activities, which are currently undermined when compared with the importance rendered to company creation.

Since each type of academic entrepreneurial activity was motivated by specific pull and push factors (monetary as well as nonmonetary), there is, therefore, a definite need for incorporating these findings when designing rewarding schemes for academics in a resource constrained environment. Furthermore, the findings of this paper suggest that it is important to take into account the dynamic nature of entrepreneurial motivations, which change from push to pull. While the constrained environment provides initial push motives, university managers and policy makers could influence the entrepreneurial process by introducing 'pull' motives such as incentives and support mechanisms for entrepreneurship, as well as university-industry interactions. Since this research was performed in a resource constrained context, its replication in other contexts would allow more robust theory development via wider empirical comparison.

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