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A COOPERATIVE APPROACH TO ACADEMIC ENTREPRENEURIAL INITIATIVES

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Abstract: In this article we introduce a novel entrepreneurial model, the “Faculty Cooperative”, an eco-system for creating and managing academic entrepreneurial initiatives. The goal of this model is to promote academic entrepreneurship, by providing a guiding concept and tools that overcome the lack of alignment between individual academic attributes and faculty efforts in driving academic spin-out companies. Through an empirical inquiry based on an academic spin-out company in a UK university context, we have explored the key activities, actors, organisational processes and outcomes related to the formation and development stages of the academic entrepreneurship process. The empirical evidence reveals that the key principles embodied by the “Faculty Cooperative Model” namely, openness, freedom and collective shareholding, are likely to promote the entrepreneurial culture within a university context. The paper argues for the importance of developing entrepreneurial culture in conventional research focused universities, which not only improves the traditional values of teaching and research, but also enhances the dynamic capabilities of universities in a global marketplace. It is suggested that the entrepreneurial ideal is not contradictory to the conventional university missions, rather it is complementary.

Keywords: Academic Entrepreneurship, Entrepreneurial Model, Product Innovation, Spin-Off Company, Cooperatives.

INTRODUCTION

Entrepreneurship and enterprise skills are crucial to the future of world economies, especially as an agency to innovate and support the wealth creation process. Universities are seen as an increasing source of innovation and technology development that is beneficial to entrepreneurial activity (Shane, 2004; Powers and McDougall, 2005).

It is difficult to gauge the existing level of educational entrepreneurial activities but a recent study by the ‘National Council for Graduate Entrepreneurship’ suggested that an average 28 student and graduate start-ups were created per university in 2009-10 (Corbyn 2012).

Academic spin-off companies are regarded as an important means for transferring technology and knowledge from academia (Prodan and Drnovsek, 2010) but although there are some notable examples of localised pockets of support, such as Stanford’s ‘StartX’, the wider picture appears somewhat bleak. This is echoed in the large body of literature

written on academic start-ups, which describe the ever increasing demand for expanding technology transfer activities from universities to the market, but suggests that more research is needed to inform practice as to the most effective way to achieve this (Powers and McDougall, 2005).

Indeed, our understanding of the innovation process is currently changing and more than ever, universities are moving to the centre of society's knowledge production system (Philpott et al, 2011; Godin and Gingras, 2000; Caloghirou et al, 2001).

As O'Shea et al (2004) suggest, there is a need for more studies to systematically explain why some universities may be more successful than others in the commercialization of university technologies. However, the literature on academic entrepreneurship makes little reference to the alignment of individual attributes and faculty efforts in driving academic spin out companies.

In this research we aim to fill in this gap by shedding new light on a set of methods that collectively arm a would-be entrepreneur with a competitive arsenal of techniques which enable him to take a product through the entrepreneurship process. Particularly, we focus on academic entrepreneurs who, despite being loaded with academic qualifications, frequently fail to capitalize on their insights and inventions (Philpott et al, 2011). Since academic entrepreneurship is a continuous process comprised of a series of events (Friedman and Silberman, 2003; Wood, 2011), it is critical to understand what key factors are driving such a multi-stage process. Towards these ends this paper explores this process and proposes an entrepreneurial model that embraces key phases of academic venture from funding, through management to marketing mechanisms that we have labelled the Faculty Cooperative Model.

Theoretical Foundation and Research Propositions

Academic entrepreneurship is an umbrella term, which refers to the efforts and activities that universities and their industrial partners undertake in the hope of commercialising the outcome of faculty research (O'Shea et al, 2004).

The academic entrepreneurship process is often inhibited by a lack of business experience and commercial skills among academics (Vohora et al, 2004; Rasmussen et al, 2011). Consequently, the creation of spin-offs typically lacks consistent support at school level, despite the support of central administration. In this respect, universities may have competency deficiencies that could hinder the commercialisation of product innovation and new venture creation process (Clarysse et al, 2005).

Typically, having created an idea, a person (or team) is faced with the challenge of developing a business model and, in particular, finding funders, sales support and customers. While universities may be well suited to producing high quality research outputs and qualified graduates, some literature has suggested that they are poor platforms for entrepreneurial aspirations as many academic disciplines may be

unsuited to undertake hard entrepreneurial activities, such as spin-off company formation and commercialization of technology (Agrawal and Henderson, 2002; Pova and Rapini, 2010).

Evidence from Cohen et al (2002)'s research, indicates that the best way for universities to transfer their knowledge to industry is based upon the 'soft' channels, such as publications, conferences and consulting services. It has also shown that university graduates, with the skills necessary to launch companies, are likely to have a much greater economic impact than direct spin-off companies based on university IP. For example, MIT graduates have founded over 4000 companies, which account for \$232 billion in annual revenues worldwide (BankBoston, 1997).

Cohen's research seems to suggest that a university should not promote the entrepreneurial culture at the cost of losing its traditional role and values. Despite the debate over academic entrepreneurship, the dominant view stresses that the growing shift to developing hard entrepreneurial activities in universities is unlikely to be reversed in the near future due to economic, legal and financial pressures and changes happening as a global phenomenon (see Philpott et al, 2011; Etzkwitz et al, 2000 for the explanation of these pressures). It raises the concern of what needs to be done to develop the university's entrepreneurial capabilities while avoiding compromising the core competency of teaching and research.

Yet if the entrepreneurial model is to be achieved within a university, as an inevitable trend, the question remains how the faculty can integrate and align the missions of teaching and research with hard entrepreneurial outputs such as spin-off company formation? Most of the discussion of academic entrepreneurship has focused on the hard end of entrepreneurial outputs rather than addressing the alignment of both soft and hard activities.

Through a case study investigation, we attempt to provide an insight on what can be achieved through a "Faculty Cooperative" organisational arrangement. First of all, in proposition (1), we argue that in this model, when producers (the spin-off academic company) and consumers (the University teachers and students) become stakeholders in a shared organisational form, it returns improved profits and better quality products as a consequence of the nature of the shared ownership.

Secondly, in proposition (2), we suggest that a set of key values, as adopted in the faculty cooperative model, are likely to promote the entrepreneurial culture and hard entrepreneurial outputs within the university context as it also aligns with university traditional value and structure which, in return, provide academics and students who create spin-out company products, with experiences that improve their teaching or learning. We illustrate how these factors can come together to form a successful academic entrepreneurial venture by reference to a case study company, FortiTo operated within a "Faculty Cooperative" mechanism.

Methodology

This research adopts an in-depth literature analysis in combination with an exploratory case study approach to explain how universities can develop its entrepreneurial culture and capabilities without compromising its traditional values (Yin, 2003).

Our empirical investigation, based on a case study, reveals a novel approach to integrate entrepreneurial process in the university context. The data was collected from multiple sources of information: (1) A number of professorial /intellectual informants who have significant experience operating within a university environment and interacting in the technology commercialisation process. (2) A one-year period of case study investigation to explore the spin-off company's development processes, from idea generation, patenting activity, start up formation and the generation of external funding to marketing and product development. (3) Information is also gathered from document and archives relating to university policies and industry linkages. (4) Students' experience and participation. The remainder of this paper presents the main findings of the case study analysis.

The Faculty Cooperative Model Historical roots of the cooperative model

The motivations underlying this model lie in a variation of a much earlier scheme for self-help and cooperation, the Cooperative Movement in which people formed mutually supportive groupings to benefit their wider community. In more practical terms under socialism, collectives were an instrument to boost agricultural productivity and provide a much-needed measure of food security (Zheng, 2010; Chen, 1998, Zuo, 2001). As far as production was concerned, the advantages lay in the nature of ownership and control (Pierson, 1995).

Under capitalism, the means of production and economic surplus are privately owned, while under socialism, the ownership and economic surplus were transferred to government, legally, in the name of the people. The distribution of this 'publicly-owned' surplus is subject to claims by all sectors of socialist society and is a deliberate political process (Davis, 1985).

The collectively owned cooperatives were literally owned by the employees, in which the distribution of profit was subject to claims by the collective shareholders (Chen, 2008; Yano, 2004). The Cooperative Movement can be traced back to the UK in the 18th century when groups, such as the Scottish "Fenwick Weavers Society" (formed in 1769) or the "English Lockhurst Lane Industrial Co-operative Society" (formed in 1832) and now known as the "Heart of England Co-operative Society" became the forerunners of a worldwide movement that saw cooperative groups move from community stores to schools through to business cooperatives.

One notable cooperative was the English "Rochdale Society of Equitable Pioneers" (founded in 1844), which established a set of

principles that co-operatives still use. These principles include the need to have an open and voluntary membership, the need to avoid unfair discrimination between people, that members should have a sense of altruism (note that this does not prevent members enjoying financial rewards) and that the enterprise should be funded by the members. (Zeuli and Cropp, 2004).

There are numerous variations of these principles such as the “Emelianoff’s three cooperative business principles” which seek to embody a principle whereby members may receive “outputs at-cost” (but to non-members at good profit levels), a “proportionality principle” which seeks to allocate benefits according to stakeholding and a “self-financing principle”. Cooperatives remain popular options for organising work and, for example, the United Nations previously designated 2012 as the “International Year of Cooperatives”. In terms of membership numbers it has been estimated that there are, globally, around 800 million members of cooperatives with almost 100 million people being employed by them (Diepenbeek van, 2007).

The arrival of the Internet has also spawned some community based self-help support for start-ups, such as the UK ‘Kickstarter’ (www.kickstarter.com) which on 8th February 2016 announced it had funded its one hundred thousandth project since starting in April 2009. Another somewhat interesting development is that since the financial downturn of 2007, the West has seen a revival in the popularity of cooperatives, or their close relative, the mutual (a company or organisation owned by more than 51% of the employees).

Speaking at the 2012 “Business as a Mutual” conference the then UK Minister for Civil Society, Nick Hurd MP, explained that the thinking of the conservative government was to see significant attractions in turning government services (eg education, health, fire services etc) into mutual companies, owned by the employees having made this one of their policies (passing laws to support this) (Hurd, 2012).

One factor in the adoption of this policy is that some findings suggest Mutuals can save up to 30% over traditional government counterparts by eliminating bureaucracy and improving motivation and responsiveness of organizations. In his keynote talk, Nick Hurd said that his government thought the age of mutual models for business had arrived which was particularly motivating for the work reported in this paper, since it adopts a similar approach. Of course, there are numerous potential hybridisations of the cooperative model, one of which we describe in this paper which we have labelled “The Faculty-Cooperative” which we argue provides a powerful means to motivate and empower academics to create entrepreneurial ventures.

How does the Faculty Cooperative fit in the university context?

The Faculty Cooperative organisational arrangement seeks to lever some of the founding principles of universities, which were characterised by an ethos of sharing knowledge and providing mutual support. By pooling

knowledge and effort, educators have historically gained a collective synergy, which has benefited educators and students alike. To date, such sharing of knowledge and resources has largely been an informal process via publishing papers and harnessing personal relationships between academics. In that spirit “The Faculty Cooperative is a venture that provides a means whereby academics (and students) can be both the owners and customers of the IPR they generate, thereby providing synergy to optimize the educational product for the market, provide an embedded sales team and offer a source of investment for academic enterprise” (Callaghan, 2012).

As explained earlier, it is based on the earlier principles of social cooperatives and collectives originating in the western world and China. The general idea is that academics who originate innovative product ideas can become entrepreneurs by creating businesses that offer stake-holding to the wider academic community (including universities as institutions) in the form of investment, shareholding and work.

In some certain cases, such as ‘educational technology’, the academic investors are likely to be experts and users in the area concerned which means the product specifications are well matched to the usage needs and, the investing academics are well placed to act as marketing evangelists in support of the company sales.

The Faculty Cooperative model promotes the self-reinforcing cycles that lead academic entrepreneurs to dedicate their expertise and knowledge to the exploration of emerging opportunities and, more specifically, it drives their commitment and degree of involvement in the projects and continual entrepreneurial activities. Clearly this is a complex entrepreneurial eco-system.

Indeed, universities are a form of educational eco-system, which might be viewed as a form of state assigned academic collective, comprising a group of academics (labelled with a university name, eg Canterbury Christchurch University etc), a resource (buildings, degree conferment rights etc) with the responsibility to use them to the good of the country.

While a traditional university is bounded by the physical limits, the Faculty Cooperative views it as comprising more virtualised boundaries in which the entire academic system is decomposed into groups or specialities (business studies, computer science); virtualised academic collectives. In this organisational form, academics in differing institutions can collaborate together to advance their entrepreneurial visions. In this sense, the Faculty Cooperative is a virtualised academic cooperative.

Open Innovation and the Faculty Cooperative

As was described above, academics are, by and large, strong advocates for an open approach to innovation, based on well-established principles of openly publishing knowledge and actively seeking to collaborate with fellow researchers. In an earlier European example, “Living Labs”, Universities extended such open research cooperation into local government and communities, engendering cooperation to mutually

improve the technology that impacts all our environments (Pierson, 1995; Wu, 2012). The concept of open innovation places a strategic emphasis on developing and intensifying collaboration across industry networks and partnerships, opening up their innovation processes in line with the open innovation framework (Chesbrough, 2006). One important assumption underpinning the concept of 'open innovation' is that an organisation cannot innovate in isolation (Chesbrough, 2003; Laursen 2006).

Under a turbulent business environment and hyper-competitive market conditions, innovation is considered as a major engine to enhance business performance and to strengthen an organisation's competitiveness in the marketplace (Lechner, 2003) (Lee, 2001) (Lavie, 2006; Wu, 2008). In furtherance to this principle, The Faculty-Cooperative model seeks to devise a model whereby the company structure and investment follows such an open co-creative framework by seeking to make the IPR, shareholding (investment) and strategy to be owned by the academic community in as transparent a way as is possible. Later in this paper we further explain this model from various perspectives, principally the faculty members, the students and the company personnel.

Principles of the Faculty-Cooperative

In this section we present the core principles of the Faculty-Cooperative model. It is important to understand that whilst a collective ethos underpins this model, it recognises that any new enterprise is competing in a free-market and that the company should operate in the normal way for a commercial company.

Table 1
Principles of a Faculty-Cooperative company

Openness	Support for open innovation (collaboration across academic, industry and customer networks and partnerships) Support for open implementation standards (eg interfaces) Support for open source design standards (eg product specifications) Support for open sharing of related work (eg assignments)
Freedom	To use the product for education without restrictions To study and modify the products (eg student project work) To profit from the contributors IPR and work (eg faculty or student remuneration)
Collective Stakeholding	A mechanism whereby academics across a number of differing universities are able to share in the operation of the company. A mechanism whereby academics across a number of differing universities are able to be shareholders (to invest and share in profits) A mechanism whereby academics across a number of differing universities are able to influence the educational product specification A mechanism whereby academics across a number of differing universities involved in the enterprise can receive benefits (eg discounts or direct profit share)

In setting out the principles of how the Faculty Cooperative functions we have drawn extensively on the principles underpinning cooperatives, collectives and more modern mutual enterprises. From these we have selected the following mix that we feel are appropriate to an academic or faculty cooperative. It is also useful to understand that we are still in the early stages of developing the Faculty-Cooperative model, and like any complex eco-system it is evolving continuously, as it's fundamentally driven by its membership and the dynamics of the world it operates in. Thus table 1 represents our starting position on the evolutionary path of the Faculty Cooperative. In part, this is an emergent model, in that the direction is shaped by the spontaneous behaviour of its members and as such, there is no deterministic method of predicting where it will go, rather a set of principles, presented in table 1, which will guide it on its journey.

A Stakeholders View of the Faculty Cooperative Model

Based on the empirical data, the following shows the advantages of the Faculty Cooperative model from the viewpoint of the various stakeholders, ranging from students to faculty. It is important to note that students are seen as important stakeholders in the Faculty Cooperative entrepreneurial eco-system, despite the name suggesting otherwise. In this model, the different perspectives are as follows:

- For non-entrepreneurial members of university staff, the Faculty-Cooperative represents an opportunity to become stakeholders in the “tools of their trade”. This stake-holding takes the form of being able to

contribute to the specification and nature of an educational product and to share in a financial reward from the combined intellect of the academic system that they have committed their life to.

- For entrepreneurial members of university staff the Faculty-Cooperative provides all the advantages of the non-entrepreneurial member (described in the previous section) but, additionally, provides the academic entrepreneur with a source of finance by offering a large number of low cost shares to the academic community, thereby raising the required capital to fund the company, without seeding control to another single and dominant investor. Furthermore, it offers a pool of tangible and intangible resources to incubate any new ideas in an embryonic state for entrepreneurs aiming to start a new venture with/in the university.

- For non-entrepreneurial students, attending university for the sole purpose of education, they would be essentially unaware of this organisation but indirectly benefit from staff that are better connected to their future workplace.

- For entrepreneurial students, the Faculty-Cooperative represents an opportunity for them to apply their newly acquired knowledge, exercise their product innovation / entrepreneurial skills and enrich their CV. Apart from that, there is the added bonus of earning some welcome income.

- From a customers' prospective (universities, faculty members, students, public etc) they receive a better quality product, designed and tested by the leading experts. In the same way as there is some enthusiasm for green products that benefit the earth's eco-system (the environment debate) then customers (the universities) can feel good about supporting and improving their own educational eco-system via the mutually owned Faculty-Cooperative.

- For company personnel, the Faculty-Cooperative provides a "feel good factor and public image" from being associated with a worthy cause (the education business, that transforms lives positively) and a profitable business.

A Case Illustration: Bringing it together

To illustrate how these ideas could come together we describe the case of a new company that has spun out from students connected to the Universities of Essex and the Instituto Tecnológico de León called FortiTo Ltd (www.FortiTo.com), or 42 for short. This company produces innovative educational technology to support the teaching of the Internet-of-Things (IoT).

The IoT refers to a vision of the world in which, everything in a person's life from bathroom scales through cookers, to cars might have an Internet connection, the behaviour of which can be orchestrated by people or their agents. There are no reliable estimates for the size of this market but one estimate is that by 2020 the IoT market could be worth between 22 billion and 50 billion dollars made up of some 16 billion connected devices (Vermesan & Friess 2011). Most commentators believe this to be a conservative estimate.

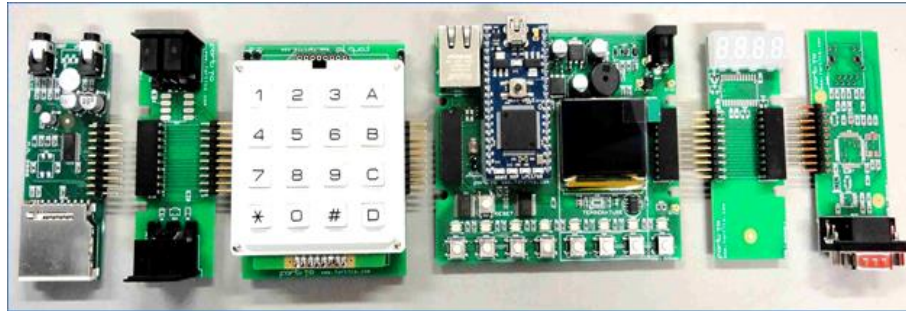


Figure 1

FortiTo Modules - From Left to Right Audio, Midi, KeyPad, Base (Processor), LED & Network.

Clearly, with such massive market potential, the IoT is an important topic to teach to students aiming to become future entrepreneurs. In that spirit, FortiTo has taken its inspiration from the need to provide a means for entrepreneurs to rapidly prototype Internet-of-Things innovations and support students in learning about this

technology. In particular it provides a modularised system in which components can be assembled in various combinations to produce an almost endless variety of products (see figure 1). The particular approach taken by FortiTo is that the “plugging together”, not just effects electrical connections (as in other products) but also the product’s physical structure; thus, for example they can be plugged together to produce a desktop robot (see figure 2).

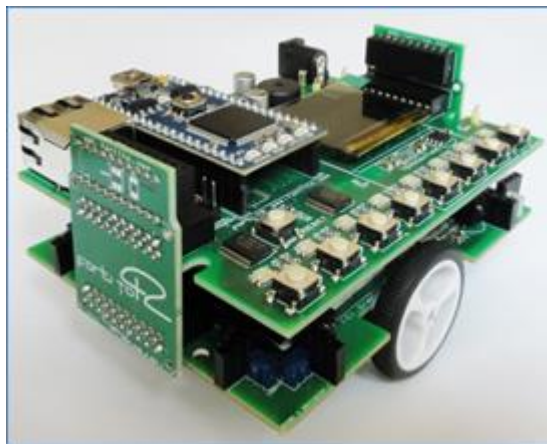


Figure 2

FortiTo Modules -A Desktop Robot Assembled from FortiTo Modules

Discussions with the founders of FortiTo reveal that it embodies the “Faculty Cooperative” principles in numerous ways. For example, considering ‘Openness’; FortiTo is adopting many industry standards such as mbed and RPi processors, I2C bus technology and C/C++ programming. Considering ‘Freedom’; the company makes use of freeware software tools (eg gnu), has opened its interface specifications and computing architecture, so that students and faculty have the important details available for educational assignments and projects.

Table 2a
FortiTo Shareholding



Table 2b
FortiTo Stakeholding

Stakeholder Type	Role	Benefits
Employee	A person employed by cooperative	Salary product discounts
Member	Person holding a paid or unpaid role in the cooperative	Discount on products
Customer	Person owning cooperative products	Help specify products & services

In respect of the ‘Collective Stake-holding’; the company, while in an embryonic stage, is currently made up of students from the two universities concerned and is actively seeking to expand membership, gather funding, create product specifications, conduct evaluations and to market products in cooperation with as wide a slice of the international educational community as is possible.

Table 2a and 2b summarise the current cooperative membership structure for the company. From these it can be seen that members of the educational community are offered a stake-holding in the form of what is termed ‘resource units’ (either work packages or financial investment) in return for a shareholding of FortiTo.

Beyond shareholding, the company is committed to providing benefits in the form of product discounts and profit share to its members. By virtue of this arrangement the company benefits from investment and a large sales force from its cooperative members, plus the increased levels of motivation and commitment discussed earlier. Also, and rather uniquely, a university base brings an international dimension through overseas students and staff, an advantage FortiTo has already benefitted from as their manufacturing and sales are already established on two continents.

Conclusion and implications

This research, based on an exploratory case study of an academic spin-out company, has shown that an appropriate organisational structure is needed to provide the conditions in which individual academic actors and faculty efforts can be aligned to achieve their separate objectives.

Many academic entrepreneurship studies have advanced our understanding of knowledge transfer and innovation commercialisation activities, but have done so primarily by emphasizing the independent factors that affect performance outcomes in the creation of spin-off companies or the formation of technology licensing agreements (Agrawal, 2006; Agrawal and Henderson, 2002; Pova and Rapini, 2010).

Our study departs from this perspective to consider an integrated approach to address the alignment between individual actors and the faculty structure and processes. As such, this paper provides a conceptual model (an entrepreneurial eco-system) and an associated set of propositions that integrates the operational and instrumental factors to reveal an effective approach for academic entrepreneurship at both university and individual levels.

An important implication of this case study research is that under the “Faculty Cooperative” arrangement, where producers (the spin-off academic company) and consumers (the University teachers and students) become stakeholders in a shared organisation, there is potential for improved profits and better quality products.

We, therefore, argue that the key values of the “Faculty Cooperative” model lies in its ability to promote an entrepreneurial culture and outputs within the university context while, at the same time, enhancing university traditional values in the learning circle.

Limitations

While this study provides some new insights into the entrepreneurial process in universities, it is not without its limitations. It is based on the experience of a single spin-off company and a limited number of university environments that, in a wider context, the findings may not be fully generalisable to.

However, we do not attempt to generalize the findings, rather we aimed to explore what underpins the creation and formation processes of academic entrepreneurship and provide an explanation of what can be achieved and how different factors interact to influence the outcome, through the experience of a successful academic business venture.

This can only be achieved through undertaking a more detailed case study research project. Thus, further research to test the model in different university contexts or with a larger sample size, would meaningfully inform continuous development of the effective model of academic entrepreneurship and the Faculty Cooperative entrepreneurial eco-system approach.

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