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BUSINESS MODELS AND COMPETITIVE ADVANTAGE FOR TECHNOLOGY TRANSFER ENTITIES CASE STUDY: INNOVATION IN COMPANIES WORKING IN FLUID POWER APPLICATIONS

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Abstract: *The present paper deals with the topic of the modern approach of knowledge transfer in the context of the open innovation mechanisms, by using the instrument of business model for the technology transfer organizations, emphasizing competition, competitive advantage and value capture.*
The companies approach to technological transfer is strongly based upon their integration in the socio-economic environment.
Each technology transfer entity or economic organization should define its business model and use it as an instrument for developing their "business" strategy.

Keywords*: Knowledge and Technology Transfer, Business Model Canvas, Porter's Five Competitive Forces, Fluid Power Companies*

1. Introduction

Knowledge transfer approach is nowadays more appropriate than "traditional" technology transfer, because of the contribution which innovation brings to growth, productivity and job creation in the actual knowledge based economy. As innovation tends to be more "open", successful knowledge transfer from the research activities become ever more critical [1]. At the same time, the deep penetration of multi-national corporations in the global economy is a reality and if anyone wishes to valorise the benefit of investment in public research systems, it should be "build strong bridges" for knowledge transfers towards indigenous businesses whose weak capacity to undertake open innovation may negatively influence their performance. The inherent "barriers" between R&D entities and firms must be well understood and it should be created mechanisms capable to efficiently address them.
At international level, especially in EU countries, the most important technology transfer activities are: patenting assistance; technology licensing; spin-off assistance and/or financing; liaison for contract research. Independent technology transfer entities, being established separately from universities or research institutes, are focused on spin-off support / assistance, i.e. business incubators or accelerators. This specificity is associated to their origination, typically from concerted action of governments and chambers of commerce or industry associations, with a strong emphasis on regional economic development. In recent years, there has been greater interest in creating spin-off companies, mainly when the newly created technology has a relative broad area of practicability, although it is a complex and expensive process, the rate of "mortality" in the early years being high, only very few succeeding to become large firms of surviving in the market.
Following the professional opinion of Porter [2,3], it is mandatory that organizations have their own strategies, reflecting their needs and plans, depending on their institutional configurations and external environment. Organizations adapting to new institutional arrangements and responding efficiently to new demands should be able to choose the way they reorganize themselves. In this respect, Duczmal [4] illustrated the example of a not-for-profit organization, such as a higher

education institution, that adopted added value strategies not just for money, but working in the benefit of the society and attaining performance in their mission accomplishing.
In Porter's approach, we distinguish two families of business concepts or strategies useful for industry analysis as follows: product differentiation strategy and efficiency or cost leadership strategy [5]. The first type of strategy refers to the fact that the organization is unique as serving a specific market and offering products / services that are different from the products offered by other suppliers. In the second family of strategies, the advantage of the organization lies in its ability to produce its product in a less costly way as compared to its competitors. As further identified by Porter, strategies can be directed towards either a broad market, or specific market segments. As a possible situation, but not always, by targeting the broad market, it may lead to an increased added value and a better competitive position of the company [4].
The term of "business model" has been traditionally applied to information technology. In the entrepreneurship literature, the concept is generally understood as the logic of how an organization operates and creates value for its stakeholders.
Three key thematic areas address the business model concept:
- application in e-business and information technology;
- strategic issues, including value creation, competitive advantage and firm performance;
- technology management and product-service innovation.
Osterwalder [6] considers that the current use of business models in strategic management as an endowment, which constitutes a firm's operational and physical form.
The common understanding of business models relies on two fundamental held perspectives:
- value or customer approach and
- activity or role approach.
Firstly, the business model concept puts greater emphasis on cooperation, partnership, and joint value creation, where strategy emphasizes competition, competitive advantage, and value capture.
Secondly, the business model concept places relevance on customers and value proposition.
Chesbrough & Rosenbloom [7] raise three key differences held in business models, as opposed to classical strategy for profitability:
- value creation and delivery are essential for business models;
- financial value created for the business is not essential;
- knowledge limitations within a firm are assumed.
The Business Model Canvas, created by Osterwalder & Pigneur [8], is an integrated framework that more recently serves as a business model design tool, developed from an in-depth analysis of typologies and business model definitions, illustrated through the classification of nine key elements, which include: customer segments, value propositions, distribution channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.
At the core of the Business Model Canvas, value proposition is identified as integrating three fundamental practical aspects: value creation, value capture and value delivery.
Even if apparently being fully dedicated to profit oriented businesses, the instrument is helpful also in sectors beyond profit, particularly in the public and non-profit sectors. Thus, Osterwalder & Pigneur [8] argue that their concept of "third-party enterprise model" can also be applicable to the public sector. Also, Osterwalder & Pigneur [8] stress that any organization - no matter its nature - has a business model if it creates and delivers value and generates revenue. The difference relies to their mission, respectively organizations in the public sector being charged only with their public service mandate.

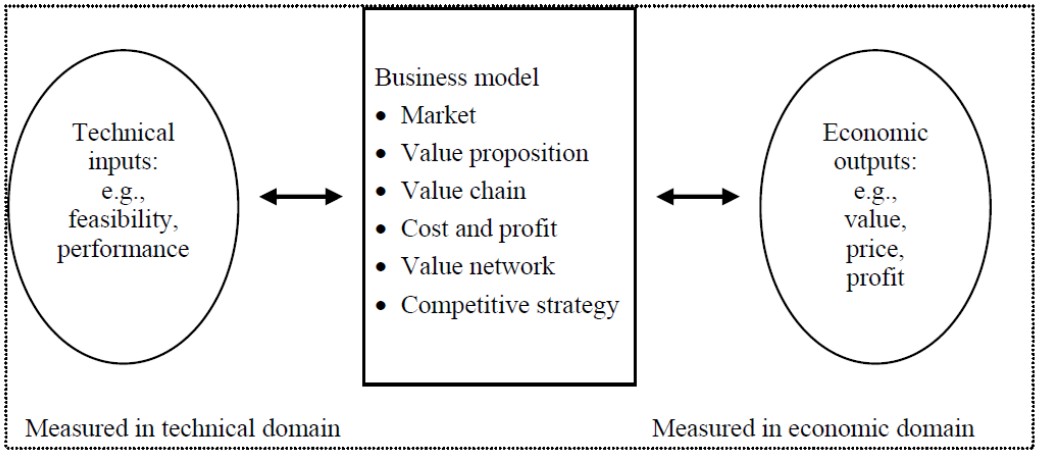
2. Objectives of the study

The present paper deals with the topic of the modern approach of knowledge transfer in the context of the open innovation mechanisms, by using the instrument of business model for the technology transfer entities or any business organization, emphasizing competition, competitive advantage and value capture.
The aspects presented in this study reveals what are the main characteristics of the business models to be used by different technology transfer entities, following the specific requests for each

organization, the influence factors related to the generation and protection of the research results in innovative activities, introduced in the frame of the nine key elements of the Business Model Canvas, in the context of Porter's Five Competitive Forces, focusing on a case study for companies working in Fluid Power applications.

3. Preliminary analysis

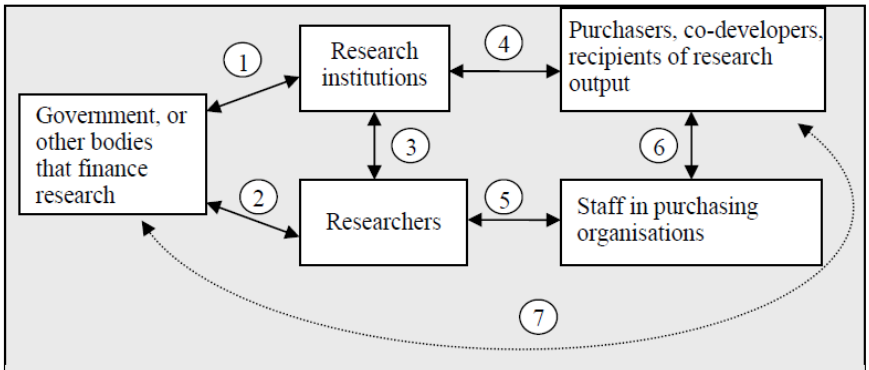
Theory and practice of technology transfer and entrepreneurial behaviour of companies have a high degree of novelty and even more when discussing about knowledge transfer. In this respect, is mandatory to deeply investigate the literature of business models, transaction costs, professional and organizational culture and of competitive advantage theory, destined to correctly identify an adequate framework for a technology transfer business model. Consequently, the topic of technology commercialization has been largely studied, but there remains much to explore and understand, because majority of organizations didn't embrace easily the concept.
One approach adopts that an entrepreneurial organization business model depicts the architecture of internal and external relationships across business functions that creates and captures value through the commercialization of technology and technical / business knowledge.
A more accurate business model definition was given by Chesbrough and Rosenbloom [7] who see it as the transforming process that allows the value inherent in a technology to be unleashed for the customer, respectively being captured by the commercializing entity (see Fig. 1).



Source: Chesbrough and Rosenbloom (2002, p.536)

Fig. 1. Framework for analysing the role of the business model

In Figure 2, are presented the relevant parties implicated in the technology transfer and their functional relations. Factors that positively influence these interactions and improve the knowledge exchange rely to: movement of personnel between private and public sector organizations, implication of personnel in lifelong learning programs developed in universities, training scientists for acquiring management techniques, getting familiar the business executives with the culture and practices of the scientific world; all these measures contribute directly to build trust and credibility between participants.



1 Governments fund the research institutions on an ongoing basis.
2 Grants typically are awarded to researchers, rather than institutions; reporting requirements are set out, but it is not a contract of employment with the funding body.
3 Employer-employee relationship, where sometimes the employee has virtually complete security of employment, through tenure.
4 Asymmetric information regarding the technology to be transferred or developed raises transaction costs.
5 Possible interaction when technology is co-developed, or when some human capital needs to be transferred; the respective staff might be from the same discipline, hence share a professional culture that cuts across organisational culture.
6 Employer-employee relationship; standard setting for principal-agent analysis.
7 Governments might also finance the purchasers through tax concessions or other policies.

Source: Dottore, A.G., Baaken, T. and Corkindale, D.
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Fig. 2. Relevant parties implicated in the technology transfer and their functional relations

By analysing the schematics presented in Figure 2, through a systemic approach, in the same line with the business model concept, and following to effectively leverage the human capital potential, any business model for technology transfer should contain elements responding to the following requests:
- Build a culture that reinforces positive prior experiences and helps to develop appropriate attitudes toward technology transfer. In this spirit, top management should enforce specific institutional arrangements, stimulating research activities in the field of user-supplier relationships, stimulating the development of an environment in which scientists with prior industry experience are encouraged and supported in their business oriented steps;
- Set an internal incentive mechanism for encouraging technology transfer, where non-monetary rewards and recognition should be added to the set of tools developed to strongly orient researchers' attitude towards improving technology transfer through an efficient partnership with socio-economic environment;
- Improve trust and credibility between R&D&I market actors, by maintaining fully opened communication channels, by organizing workshops that continuously notify both the companies and researchers about what is new, either in research laboratories or in the marketplace.
There are certain influence factors, related to the generation and protection of the research results in research organizations, which are relevant to business and incentives for their exploitation:
- Strong R&D data base of results / offer, relevant to business environment;
- Awareness of market needs and effective communication with business environment;
- Adoption of commercialization tasks as part of the research organization functional system;
- Adequate incentives for research organizations to commercialize;
- Availability of resources and programs to encourage enterprise culture in a research organization;
- Intellectual property policy (e.g., ownership) that favours technology transfer;
- Availability of resources for intellectual property protection;

- High level of intellectual property protection, including patenting, as the main driver for technology development in the knowledge based economy.

For technology transfer entities, “business model” is defined broadly and encompasses how they “make money” and how they generate value for various stakeholder groups, even if this does not correspond directly or immediately to a revenue stream. By using Business Model Canvas, is important to mention that it has major limitations, the most important conceptual problem concerning the categorization of stakeholder segments that benefit from, but also contributing to, the value proposition; these stakeholders can be categorized as both partners and customer segments (and sometimes also as resources).

At the first glace, technology transfer centres value proposition and services tend to focus on three main areas of activity:

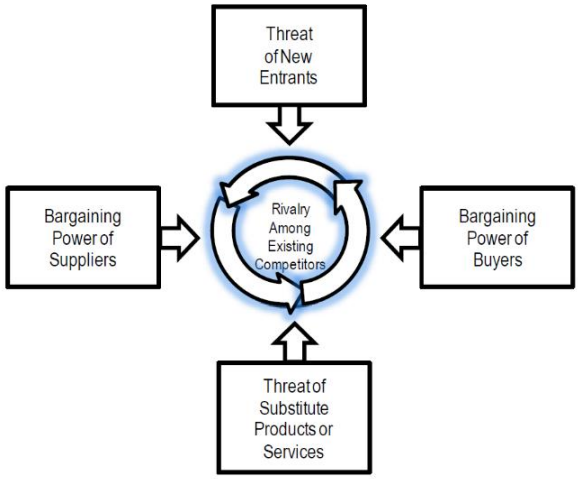
- patenting assistance + technology licensing + spin-off assistance and/or financing;
- technological and marketing skills development;
- liaison for contract research, respectively community building.

Analysing the expectation of the technology transfer centres clients, spin-offs / start-ups see “one-on-one mentoring” as the key value proposition and they request to receive stronger emphasis. Training programs are likely to have positive effects on the local ecosystem, on long term frame, but they do not appear as the most efficient means for efficient and needed support for spin-off / start-up creation.

Technology transfer centres strategic decisions target prioritizing value-maximizing activities and building partnerships, with a wide variety of stakeholders that have a partially overlapping interest in entrepreneurship and start-up support.

Consequently, governance, leadership and consortia - off all types of socio-economic actors, i.e. clusters, innovation labs and hubs etc. – building, including intermediary / brokerage entities - such as technology transfer centres - are critical for success, only when being led by a purpose-driven organization that has an inherent interest in supporting the development of an innovation ecosystem.

There are several models and frameworks used in the analyses of competitiveness of technological transfer entities in the context of globalization and knowledge based economy, being argued that competitive advantage is traditionally strictly relied to an industry. So, the competitiveness of any business entity could be determined, based on Porter’s Five Competitive Forces Model, as defined by the following: the threat of new entrants, rivalry among existing firms within an industry, the threat of substitute products or services, the bargaining power of suppliers, and the bargaining power of buyers (see Figure 3). The intensity of threats of new entering technology transfer centres, short-term substitutes, and rivalry among existing ones could be analysed over the strength of any technology transfer entity as supplier, as viewed by its clients as buyers.



Source: Harvard Business Review, 2008,
Based on Michael Porter's Five Forces of Competitive Position Model

Fig. 3. The Five Forces that shape industry competition

In the case of technological transfer entities applying focus strategy, they concentrate on a narrow client segment, and within that segment they manage to develop the best offer and capture its interest, discouraging other providers from competing directly. In this case, clients have less choice and are left with fewer alternatives to choose from, but their satisfaction could be higher.
On the other hand, a broad market-wide business concept suggests a broad market strategy, where the products / services offered addresses to a wider market segments. Organizations choosing the broad market strategy can adopt the differentiation strategy or the cost leadership strategy, when emphasizing price first and just afterwards their specificity.
However, most often is recommended to mix both strategies, offering low-cost products to some consumer groups that emphasize the price mainly, and high-quality products to those consumers that are attracted by the brand and quality of the products [9]. Technological transfer entities that consider a broad market strategy offer a wide range of services. Their offer is targeted at a wide array of client groups. Technological transfer entities that decide to adopt such a broad market strategy need to have diversified sources of financial resources.
The threats of new entrants become a competitive force when they are new and provide the same products / services. Consequently, easiness of new companies for entering an industry attracts more harsh competition.
Power of suppliers relies to the fact that if one supplier has a large enough impact to affect another company's offerings, it becomes a competitive force to consider and then it holds substantial power.
On the other hand, power of buyers is associated to the pressure that customers can settle on a business. Consequently, companies should adopt strategies so that they provide requirements and demands of customers with impact to the success sustainability and profitability of their business.
Availability of substitutes becomes a problem as buyers will have the tendency to switch to another supplier with a more competitive product / service.
All the above discussed forces contribute to analyse of the intensity of competition, to the profitability and attractiveness of an industry. In Figure 3 is presented also the interaction among the different competitive forces.
In the context of Porter's Five Competitive Forces, our study assumes that these could also be adopted as assessment factors in determining the competitiveness of technological transfer entities. Supplier in the R&D system refers to research organization; buyers correspond to companies; existing competition refers to R&D competitors; substitutes are associated to alternative intermediaries aside from the "classical" technological transfer entities offering specialized brokering services.

4. Case study: Innovation in companies working in Fluid Power applications

Accenture's Technology Vision considers a three-year set of technology trends [13]. While each year highlights the latest trends, it's important to recognize that each trend represents just part of the global picture. As organizations continue their journey towards digital businesses, they will need to keep up with the latest evolutions in technologies, and continue to master those that have been maturing. These technologies are quickly becoming the base for how organizations build their next generation of business, as well as the catalysts for many of the trends that we discuss this year.
Thus, General Electric is just one example of a wider change in how companies work today. In response to constant disruption and fast-shifting business goals, forward-thinking enterprises are reimagining their workforces. In the past, anyone—from accountants to machinists—could spend their entire careers doing the same job, using the same skills to support businesses with largely unchanging goals. But today we're seeing companies being continually pushed to change products, services, and sometimes even business models. And not just once, but constantly, as each new technology innovation emerges.
Business leaders are realizing a more liquid workforce can become their new competitive advantage (see Figure 4).

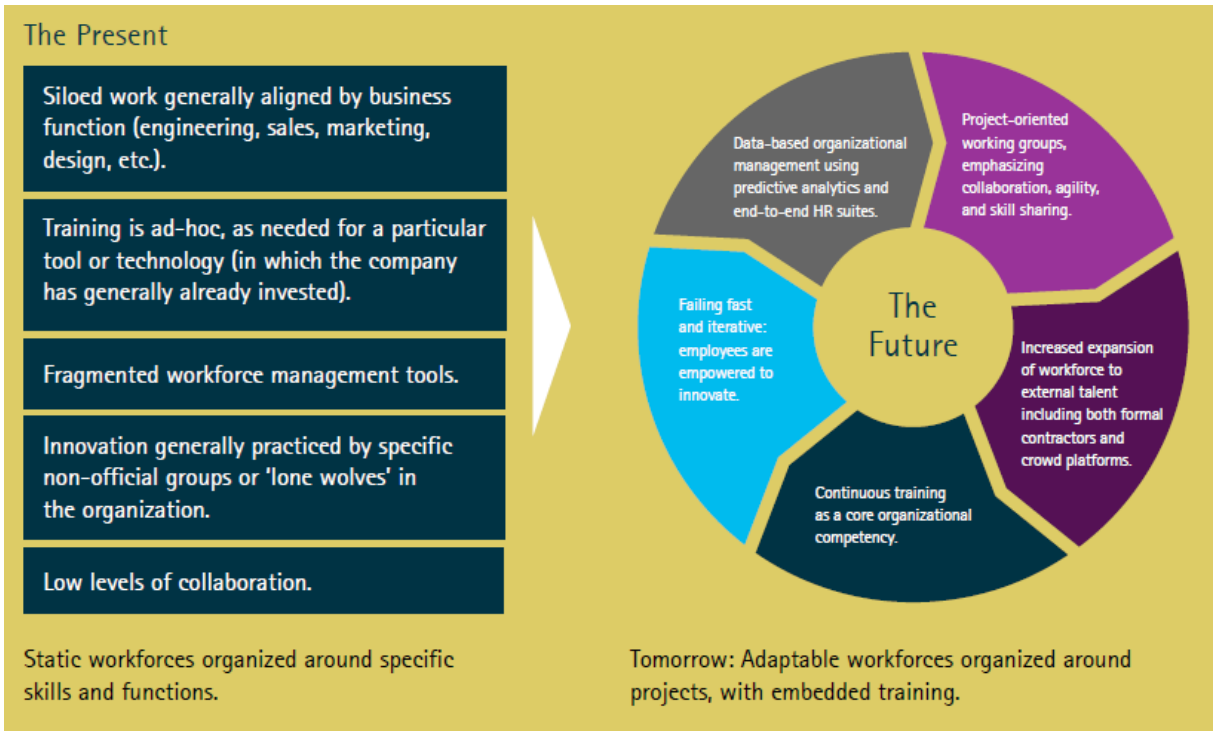


Fig. 4. Liquid workforce supporting the new competitive advantage

Companies strike attaining dynamic business for their customers by continually developing their offering, from sourcing to distribution of products, bespoke design, manufacture and partnering services. The models of several divisions sustain the strategy of achieving a focused fluid power group, as a representative example (see Figure 5). They are supported by the central services and by the key enablers.

In common with all organizations, i.e. Flowtech [14], every company faces risks which may affect its performance. There is little that can be done about the macroeconomic environment but the Board of Administration of every company believes that an adequate strategy, which is designed to exploit opportunities created by the market, places each company in a strong position relative to others, particularly where those markets are volatile. For controlling the risks, each company should be able to manage a system of internal control and risk management, destined to provide assurance that they manage the risk whilst achieving the business objectives. No system can fully eliminate risk and therefore the understanding of operational risk is central to management processes. The lasting success of any company depends on the continual review, assessment and control of the key business risks it faces. Risk review is an ongoing process and is reviewed formally by the Operational Board prior to each year end.

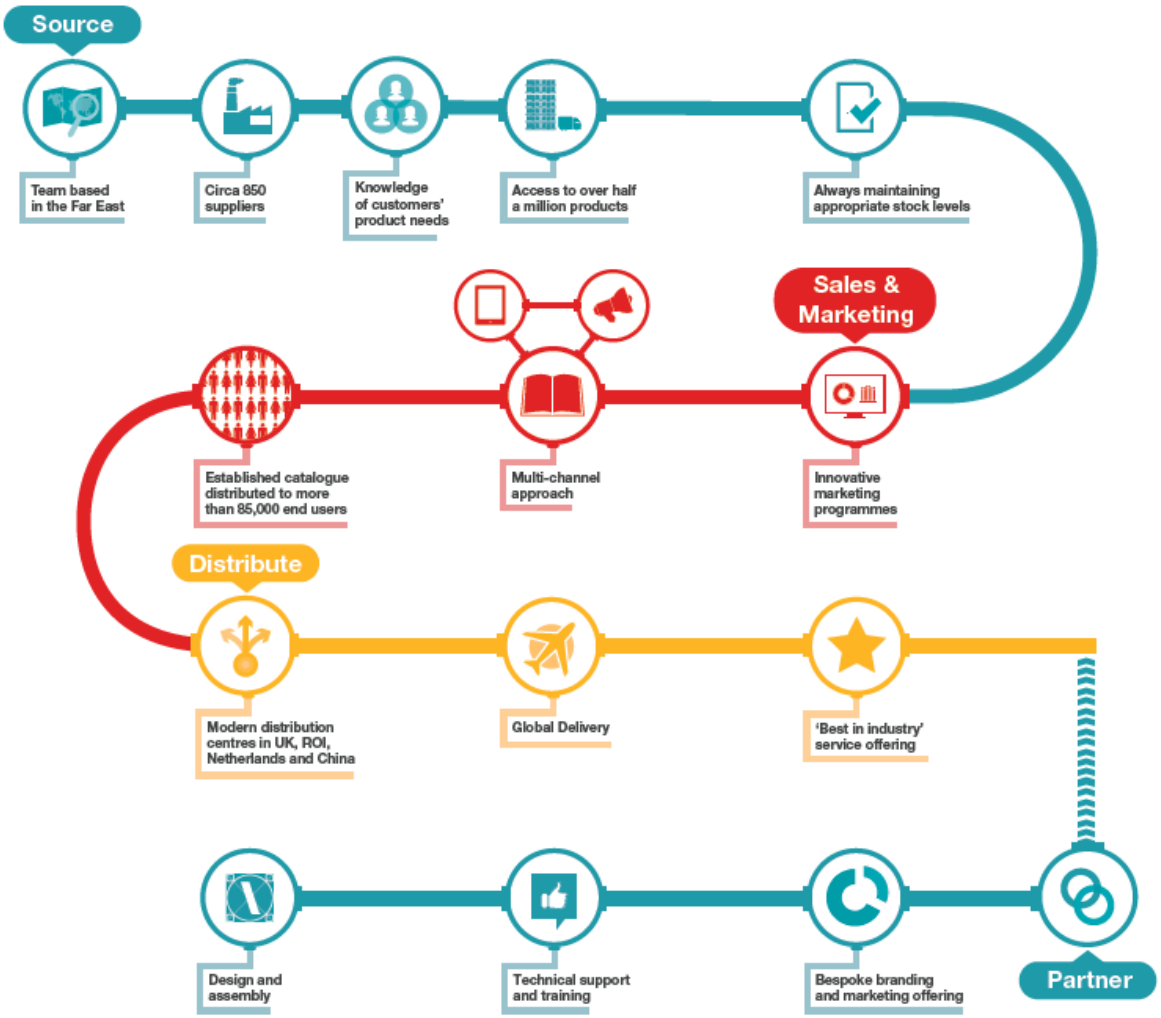


Fig. 5. The models of several divisions sustaining the strategy of achieving a focused fluid power group

The principal risks identified include (see Table below):

Number	Risk	Mitigation
	Talent management and succession planning	
1	There is a risk that the business is not able to attract and retain high performing employees. The Group also needs to maintain engagement with the employees to ensure they remain supportive of the business strategy.	Attraction and retention of employees is supported by bonus plans, recognition and reward programmes and innovative benefit packages. Succession planning process introduced by the Operational Board in 2015 to identify and develop key employees. Nick Fossey appointed to lead the PMC division in March 2016. Training forms a key part of all employees' development within their roles. Training is arranged to support the Group's business plans and the personal goals of all employees.
	System and site disruption	
2	There is heavy operational dependence on the resilience of warehousing and IT infrastructure to support business operations and maintain high service levels. The risk is present that unplanned events could disrupt the functioning of key elements of the operational infrastructure, damaging customer service and business reputation.	Off-site disaster recovery provision for IT systems including call centre relocation. Back-up generator installed at the main site with other sites to have feasibility studies in 2016. Business continuity plans in place at operational locations. As the Group increases in size, resilience to disruption increases as distribution and production activities can be re-routed to other sites.
	Inability to recognise and control cyber exposures	
3	The Group recognises there is an increasing exposure to cyber risk, including advanced techniques to disrupt our websites and direct attacks on Group systems with the potential loss of confidential information.	Current mitigation measures for local business systems include anti-virus software, virus scans on incoming emails and firewall protection. The main Group website is hosted in the cloud with dual servers ensuring automatic switchover should one fail with daily back-up procedures.

Number	Risk	Mitigation
	Quality control	
4	Many of the key components and products supplied by the Group are for industrial use, often in hazardous environments. These components and products must be fit for purpose to ensure that their reliability, performance and safety is of the necessary standard. Failure in this quality will cause damage to the Group's reputation, customer relationships and potential legal consequences.	The majority of the Group's products are sourced from reputable 'brands' in the UK and Europe. In addition, for Exclusive Brands sourced from China, the Group has quality control specialists who regularly visit suppliers' manufacturing sites to ensure that high quality standard operating procedures are being adhered to. The Group complies with ISO9001 ensuring quality standards are maintained through all its operations. Continual testing procedures are in place for both components and manufactured products. Employees involved in assembly processes are qualified with the relevant industry body awards and continue with regular internal and external training.
	Breach of regulations	
5	Inadvertent breaches of regulations could lead to prosecution and significant fines. Regulations impacting the Group include COSHH, packaging waste regulations, health and safety at work, the Bribery and Corruption Act and corporate governance.	The Group engages external specialists as required to make sure internal procedures and policies are in place to provide compliance with the regulatory frameworks. There is an ongoing review of relevant national and international compliance requirements.
	Failure to integrate acquisitions and align strategies to existing business model.	
6	The Directors believe that the fluid power marketplace is highly fragmented, and the Group's core trading entities operate in well-defined channels. Acquisition opportunities that fit within these channels will be key targets. However, this fragmented nature will often introduce channel overlap that could undermine trading performance in other parts of the Group.	The Board includes both Executive and Non-Executive Directors with considerable acquisition experience. Given that the development of the Group in the fluid power market is likely to include multiple opportunities to acquire trading companies in both the UK and Europe, future appointments will also be made as required to strengthen skills and knowledge in this area. Since the IPO, the Group has also added professionals in both general accounting and mergers and acquisitions to its internal resources in support of this process. Prior to engaging in any process the Chief Financial Officer will review any acquisition opportunity for conformance with the Board's strategy on channel management. Further detailed assessment with regard to channel conflict will be a key part of the due diligence process which will include consultation with the Group's Operational Board prior to plc Board approval and any commitment to buy.

5. Conclusions

After completion of this preliminary study, we draw some working hypotheses that characterize the "living organism" of a business model for any technology transfer entity or business organization:
- Leadership team characteristics have a major influence on business model definition, implementation and continuously adaption;
- Top management with a market orientation is more likely to understand and valorise the importance of using an adequate business model, following the mission and objectives settled by its strategy;
- Significant change in the top management team and regular re-evaluation of the business model are positively related to the necessary business model adaption, due to continuously modification of the environment, including important external threats.

With these working hypotheses, each technology transfer entity or business organization should define its business model and use it as an instrument for developing their "business" strategy.
The specific case of companies working in Fluid Power applications makes no exception. Further important trends include the design and manufacture by using on a large scale the mechatronics concepts of components and systems, modularisation and use of materials and energy which minimises the impact on resources. The main challenge today, however, for both manufacturers and operators is energy efficiency in industrial processes, not least in view of energy costs. Consequently, new business models are already being adopted on a large scale, for example intensified after-sales service and a greater focus on the total cost of ownership and condition monitoring systems.
Concluding, in the actual global competition, the power transmission engineering and fluid power industries benefit from their use of the latest technologies for all kinds of applications throughout

the value creation chain. As the most important suppliers to the machine and installation construction industry, these two industries help to create a political environment in which climate and energy-policy objectives can be attained. They are ready and able to take on the challenges of changing markets, acting on the principle, more important than ever before, not least because of regional considerations, of “Think global, act local”.

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