

**The Impact of Marketing Skills and Negotiation Skills of Universities Technology Transfer Office on Technology Transfer Success**

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**Abstract**

In this research, we are interested in university-industry technology transfer. We aim to assess the impact of marketing skills and negotiation skills of technology transfer office (TTO) on the success of universities' licensing, patenting and research based companies. The survey questionnaire was responded to by 143 participants of engineers that are members of laboratories and research units within Tunisian engineering schools. The empirical results indicate that there is a positive impact of TTO skills on university-industry technology transfer.

**Keywords:** University-Industry, Technology Transfer Office, Marketing Skills, Negotiation Skills

**Introduction**

Siegel and al. (2003) define technology transfer offices (TTO) as an emerged organizational entity which aims to “facilitate commercial knowledge transfers from universities to practitioners or university-industry technology transfer (UITT)”. According to Siegel and al. (2003), the most important motives of TTO are the protection of university's intellectual property, the smooth diffusion of technology as well as the ambition to secure additional research funding. Moreover, “creating a specialized technology transfer office within a university can be instrumental in

developing relations with an industry" (Macho-Stadler and al, 2007). Likewise, Powers and McDougall (2005) consider TTO as an important intermediary between university and industry. They state that "Given that faculty typically know relatively little about the business of technology commercialization but usually have a high degree of psychological ownership for their inventions, TTO professionals are key players in the commercialization of a technology". Thus, TTOs reconcile higher education and industry cultures (Powers and McDougall, 2005). Debackere and Veugelers (2005) state that "creating a specialized and decentralized technology transfer office within the university is instrumental to secure a sufficient level of autonomy for developing relations with industry".

Charles (2006) adds that technology officers have to be skilled at "boundary spanning" since they play the role of "gate keeping" and bridge the gap between firms and scientists. This skill is also emphasized by Youtie and Shapira (2008) who consider the TTO as "a boundary-spanning organization between the research and entrepreneurial and industrial communities". Moreover, Debackere and Veugelers (2005) mention other roles of TTO. For instance, they note that "the management of intellectual property and business development, reduces the asymmetric information problem in the scientific knowledge market and contributes to prevent conflicts of interest between the commercialization and the research and teaching activities". Seeing that the university environment is usually non-commercial, Lockett and Wright (2005) assume that TTO has a critical role in "business coaching" and "stimulating entrepreneurial activity". Shea and al. (2005) add that "The technology transfer office plays a key role with respect to engendering academic entrepreneurship". Furthermore, Siegel and al. (2003) note that TTO structures deals between scientists and entrepreneurs. Thus, TTO arranges networks between scientists and industry in order to start a company and to provide it with the necessary consultation; thanks to the experience and the expertise of the technology transfer personnel.

In this research, we are interested in the impact of TTO's skills on the success of university-industry technology transfer.

## Literature Review

Indeed, Thursby and Kemp (2002) consider, in their study of growth and productive efficiency of university intellectual property licensing, five outputs of UITT, namely:

1. Sponsored research agreements between universities and industry.
2. License agreements which permit the use of university intellectual property by private sector firms.
3. Royalty payments received by universities in exchange for the use of intellectual property.
4. Disclosures by faculty to their central administration of potentially commercializable innovations.
5. University patent applications.

Likewise, Lockett and al. (2005) assume that the dominant routes to commercialize public sector intellectual property are patents, licenses and the formation of research based companies.

Hence, we identify, in our research, the successful UITT as the dependent variable. In order to identify its measures, we devote the next paragraph to the implications of the successful UITT such as university patenting and licensing.

Indeed, Elfenbein (2007) considers patenting as the key of transferring university know-how; and he states that “Each technology that the university patents is a realistic candidate for sale to outside parties”. Furthermore, Powers and McDougall (2005) note that “While patenting is no guarantee that a university-developed technology has future marketability or that it will even get developed into a product, it does represent a primary tool for safeguarding its future potential”. They also state that “Obtaining patents also signals to important outsiders that an institution is serious about commercialization and recognizes the needs of for-profit firms because the university was willing to invest the necessary time, effort, and expense in obtaining patents. As a result, established firms may be more interested in obtaining the technology”.

Moreover, Jensen and Thursby (2003) consider the university licensing as a critical output of UITT and they suggest a model of the university licensing process including the central administration of the university, the technology transfer office (TTO) and the faculty inventor. They note that “Essentially, the administration selects contract terms for both the TTO and the inventor, who then play a sequential move game of disclosure and licensing”.

Indeed, in this research, we consider “research-based companies” as “an umbrella term” for research spin-offs, university start-ups and research joint ventures. To explain the reasons of research-based company foundation, Elfenbein (2007) state that “The preponderance of inventor-founded firms in some settings may be a response to inventors’ inability to find potential outside buyers for the technology, a response to the difficulty in transferring knowledge about the inventions across organizational boundaries, or a solution to incentive problems”. Conversely, Lockett and al. (2005), assume that the research-based companies’ establishment is determined by the university success in patenting and licensing its own technology. Lockett and al. (2005) also relate faculty quality, commercial capability, and the extent of governmental science and engineering funding to the high rates of university start-up formation.

Indeed, different studies assess the role of technology transfer offices (TTO) in the success of university-industry technology transfer. For instance, Siegel and al. (2003) believe that TTOs are often either too narrowly focused on a small set of technical areas, or too focused on the legal aspects of licensing. They add that “with regard to barriers to technology transfer, firms and entrepreneurs were inclined to point out that the marketing, technical, and negotiation skills of the TTO could be substantially improved”. This discussion leads us to propose the following hypothesis:

H1. The TTOs’ skills influence the success of UITT.

### **Methodology**

In this research, we are interested in Tunisian engineering schools that are stakeholders in a technology transfer process. Our sample is composed of the 33 national engineering schools research laboratories and units.

In this research, we assess the impact of TTO skills on the success of universities technology transfer. Therefore, we addressed our questionnaire to 143 engineers that are members of laboratories within the national engineering schools.

To test this hypothesis, we used the following measures: technical, marketing and negotiation skills as well as legal aspects of UITT (see Table 1).

Variables	Measures	Questions	Scale
Technology transfer office skills	Technical skills	Lack of TTO's good technical skills	Strongly agree-strongly disagree
	Marketing skills	Lack of TTO's good marketing skills	Strongly agree-strongly disagree
	Negotiation skills	Lack of TTO's good negotiation skills	Strongly agree-strongly disagree
	Legal aspects of UITT	Lack of TTOs' mastery of the legal aspects of UITT	Strongly agree-strongly disagree

Table 1. Research variables and measure

## Results and discussion

We represent in Table 2 the results of the factor analysis.

Test	values
Bartlett	0.000
KMO	0.538
MSA	TS1
	0.561
	TS2
	0.527
MSA	TS3
	0.533
MSA	TS4
	0.543

Table 2. Results of factor analysis

The results of the Bartlett, Kaiser–Meyer–Olkin (KMO) and MSA tests presented in table 2 are significant. Hence we maintain that the independent variable TTOs' skills is factorable since:

1. The Bartlett signification is inferior to 0.005
2. The KMO measure of sampling adequacy exceeds 0.500
3. The MSA measures exceeds 0.500

In fact, the items of this variable are:

1. TS1: Technical skills
2. TS2: Marketing skills
3. TS3: Negotiation skills

4. TS4: Legal aspects of UITT

Items	Loadings	communalities
TS1	0.856	0.549
TS2	0.849	0.732
TS3	0.741	0.721
TS4	0.699	0.489
Eigenvalues	2.491	
% of the variance explained	62.286%	
Chronbach's alpha	0.790	

Table 3. factorial structure of the independent variable TTO's skills

Table 3 indicates the existence of a single factor that explains 62.286% of the total variance. The communalities are positive and exceed 0.5. The eigenvalue exceeds 1. But, the loading of TS4 (Technology tacitness) is inferior to 0.5. After removing this item, we obtained different results:

1. The Bartlett signification is inferior to 0.5
2. The KMO measure is 0.5
3. The MSA measures are 0.5
4. The percentage of the variance explained reaches 71.128%
5. The loading are improved
6. But the communality of TS1 (Technical skills) is inferior to 0.5

After removing this item (TS1), we obtained better results:

1. The Bartlett signification is inferior to 0.5
2. The KMO measure is 0.5
3. The MSA measures are 0.5
4. The percentage of the variance explained reaches 90.866%
5. The loading are improved.

We choose, then, to eliminate these two items (Technical skills, Legal aspects of UITT). Hence, descriptive statistics of our variables may be illustrated as follows (see table 4).

Variables	Measures	KMO	Chronbach's alpha
TTOs' skills	Marketing skills	0.538	0.790
	Negociation skills		

Table 4: Descriptive Statistics

Table 4 indicates acceptable results. Indeed, we used Kaiser–Meyer–Olkin (KMO) index to test the factorizability of the item correlation matrix and we judged it according to the KMO and MSA indexes exceeding 0.50. Also, we follow Uysal and Ozcan (2011) and accept in our research Cronbach's alpha coefficients exceeding 0.70. In their words, “A higher value than 0.70 for Cronbach's alpha indicates good internal consistency of the items in the scale”.

In this research, we carry out a regression analysis. The results concerning the variable “TTO’s skills” are summarized in Table 5.

Independent variable	Dependent variable	Successful UITT
Standardized coefficient ( $\beta$ )	-0.062	
One-tailed test of significance (GDT)	1.000	
R square	0.004	
% of the variance explained	0.4%	
Fisher coefficient	0.553	
Fisher signification	0.458	
Durbin-waston coefficient	2.405	

Table 5: Descriptive Statistics

Table 5 shows that the one-tailed test of significance (GDT) coefficient is superior to 0.1. Therefore, we assume that, the independent variable “TTO’s skills” has no influence on the successful UITT. Thus, our hypothesis is rejected.

Contrary to Siegel and al. (2003), this hypothesis was not verified in our research context. Actually, according to the respondents, marketing and negotiation skills are indispensable to any TTO. Consequently, they deny the concept of the lack of TTO’s skills. Hence, in our research context, the lack of TTO’s skills is not an impediment to UITT. This result may be explained by the newness of TTOs in Tunisia. Indeed, Tunisian universities rely on governmental support to transfer their technologies.

### Conclusion

In this research, we assessed the relationship between TTO’ skills and the success of university-industry technology transfer. We carried out a personal survey. We addressed our questionnaire to 143 members of Tunisian universities and research centers. Then, we performed a regression analysis. Surprisingly, our empirical results do not indicate positive relationship between TTO’s skills and university-industry technology transfer. We explain this finding by the newness of TTOs

in Tunisia. Indeed, Tunisian government plays a critical role in transferring universities' technology which replaces the role of TTOs.

Finally, our research suffers from different limits such as the limited number of respondents (143). Future researches may consider larger samples and different cultural contexts.

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