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The Technology Transfer Functions of Genuinely Entrepreneurial UK Universities Exhibit an Ambidextrous Hybrid Management Structure

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ABSTRACT

Forty-five UK universities were approached, drawn from 21 universities whose client technology/knowledge-transfer firms perform consistently well (category 1 universities), and 24 universities whose client technology/knowledge-transfer firms perform consistently poorly (category 2). Contact was established with staff in the Technology Transfer Office (TTO) or similar department, resulting in 72 persons identified as either "leading" TTO staff or "operational" TTO staff. These individuals were subject to semi-structured interviews around a 10-point questionnaire to arrive at consensus opinions. Results indicate that independently of whether the university is regarded as "entrepreneurial" or not, the TTOs of category 1 universities are more ambidextrous than those of category 2 universities.

KEYWORDS

Ambidexterity; Entrepreneurial University; Innovation; Technology Transfer

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1. Introduction

Porter (1988, p73) showed that; "*a nation's competitiveness depends on the capacity of its industry to innovate and upgrade*" and as a consequence, state-sponsored Science Parks and tech transfer from universities are often invoked in programmes of national and regional development, often supported financially by government-supported research councils (see e.g. SQU Report, 2023) in a fashion described as the "triple helix" (Etzkowitz and Leydesdorff, 1995) model, although the various shortcomings of this model have been pointed out (see e.g. Mellor, 2025). As part of this model, various factors and theories regarding innovation flow from universities to industry have been propounded: Johnson (2020) showed that complementary assets are of prime importance in technology and knowledge transfer. Older and larger universities tend to have more and better-established knowledge (as well as tangible) assets. Nonetheless Mondal and Mellor (2025) showed that many high-ranking universities are poor in successful tech transfer as recorded by the longitudinal financial analysis of their associated firms. And *vice versa*, analysing the same financial performance of associated firms, several new universities are seen to be over-proportionally successful in technology transfer (Mondal and Mellor, 2025). This implies agreement with Johnson (2022) insomuch as asset complementarity could be more important than reputation, as well as Johnson et al (2024) who say; "*as ambidexterity is not contingent on larger levels of research or KE income, nor is it necessarily contingent on organisational size*".

Both Will and Mellor (2022) as well as Audretsch and Guerrero (2023) have looked at the concept of ambidexterity in university and business. Most universities operate in a highly regulated environment and, as a consequence, (see e.g. Will et al, 2019) are relatively rigid top-down bureaucracies. Johnson et al (2024) applied the concept of ambidexterity to whole universities, concluding "*that ambidexterity is an important characteristic for the pursuit of universities' research and KE [Knowledge Exchange] activities as each underpins the other*" (Johnson et al 2024) although the authors furthermore remark that rapid action is unusual because "*the continuous interdependency of research and KE suggests that there are considerable sunk costs involved*." But is it necessary to make the whole university ambidextrous (presumably an arduous and indeed unlikely outcome) or only parts of it, concentrating on the TTO? Nonetheless the results of Johnson et al (2024) can be compared with those of Mondal et al (2024) who used SEM and Monte Carlo methods to model both the university, and also the technology transfer function (TTO), as two separate management entities, concluding that business ambidexterity in the TTO function was theoretically the most important for tech transfer. To borrow physics terminology, the research function of the university can be considered as "adiabatic" (approximately zero transfer to the surroundings, see e.g. Lavenda, 1972) whereas the TTO function is "diabatic", a veritable radiator (in this case, of knowledge) to the surroundings.

It is known that asset specificity is a major factor in universities being successful in attracting commercial partners (Johnston and Huggins, 2018; Johnston, 2020; Ng et al., 2019; Lecluyse et al., 2019; Hobbs et al., 2017), as well as that only few specialized firms cluster around university locations and indeed that knowledge transfer can occur at a significant distance away from the university primarily involved (Mondal et al 2021). It is also known that firms associated with some universities consistently over-perform while others, associated with other universities, consistently under-perform; Mondal and Mellor (2025) showed that firms associated with category 1 universities reported turnovers of over 200% above control, while firms associated with category 2 universities reported turnovers of 1% or less than control. Indeed, Mondal and Mellor (2025) also reported that the TTOs at category 1 universities self-reported a high ambidexterity score while the TTOs at category 2 universities scored lower.

Other variables may be involved in successful technology/knowledge transfer; Firms involved in university-industry collaborations are all self-selecting, presumably indicating that they all see themselves as having low costs regarding the assimilating specific new knowledge (Mellor, 2016, Vivona et al, 2020). Likewise, on average, independent variables including university reputation, university size, amount of knowledge assets and distance to

commercial partner are largely random (e.g. Mondal and Mellor, 2025). The role of universities in provision of manpower can be discounted, because graduates are highly mobile. Patents, furthermore, were also excluded for reasons elucidated elsewhere (Will and Mellor, 2019; Campbell et al, 2020, Johnston, 2022). Thus, the explanatory variable explored here consists solely of university TTO ambidexterity.

Therefore, in this paper, we surveyed the TTO functions at selected universities asking about their degree of ambidexterity both *per se* and as related to the host university.

2. Methodology

Senior university leadership at 45 UK universities was approached who were responsible for devolving the subject to their leading TTO staff and in turn also those operational TTO staff, who directly support academics and linkages to external firms/clients.

After 72 interviews, evidence had been collected and according to the principle of theoretical saturation (Saunders et al, 2018) further interviews around the questionnaire were not pursued because the main points began to be reiterated. Instead, in a second iteration, consensus opinions around key themes were formed (Campbell et al 2013). In all, 22 interviewees were classified as "leading TTO staff" and the remaining 50 as "operational TTO staff".

The principle of open and axial coding (Strauss and Corbin, 1990) was followed throughout the process with key themes being identified in each case. Of the three types of reliability (Campbell et al, 2013) only the second (accuracy) is relevant because the coding scheme was already established at one point in time (so stability is not an issue) and intercoder reliability can be neglected due to using only one single coder (Campbell et al, 2013). Reliability was also confirmed by, at each university, senior university staff at Dean or above level generally endorsing the data.

3. Findings

In order to conform to the extant literature, the nomenclature and data of Mondal and Mellor (2025) has been followed throughout. With respect to universities, those in Category 1 conform to "good performers" where longitudinal analysis over a decade shows that associated firms exhibit a consistent financial annual performance exceeding 200% of control. Category 2 contains "poor performing" universities, where under the same analysis, associated firms consistently exhibited annual financial returns of 1 % of control, or under control. The overall initial structure of the interview followed 10 questions which are loosely based on the concepts of innovation and creativity in organizations elucidated previously (Amabile 1988):

Table 1. Questions forming the basis of semi-structured interviews.

	Questions
1	How clear is the leadership structure of the TTO?
2	How effective is the division of responsibilities across management levels in the TTO?
3	How well does the communication flow between different management levels within the TTO?
4	To what extent does the TTO employ a balanced management structure (e.g., hierarchical, cooperative, hybrid)?
5	How often does the TTO adopt new ways and processes to deal with new challenges?
6	How effectively does the TTO leadership set and communicate strategic goals?
7	How frequently are leadership roles in the TTO rotated or changed?
8	How well-defined and clear are the roles and responsibilities of TTO staff?
9	Would you say the TTO can find out new ways of working and then exploit this new knowledge?
10	How adaptable is the TTO's management structure to new trends in technology transfer and innovation?

The results were refined in a second interview round, aimed at constructing consensus around emergent key themes. These are presented in the following tables. Interviewees are labelled C1 or C2 according to category 1 or category 2 origins, L for leader function or O for operational function, followed by a unique number.

Table 2. Attitudes of staff in category 1 universities.

Category 1, leading TTO staff	Category 1, operational TTO staff
• Focus on employing highly qualified staff {interviewee C1L1, C1L5, C1L6, C1L11} • High proportion of delegation {interviewee C1L1, C1L7, C1L9, C1L10} • Clear communication {interviewee C1L1, C1L2, C1L4, C1L5, C1L6, C1L7 C1L12, C1L13} • World view that the TTO is embedded in a wider network of professionals {interviewee C1L1 to C1L14 inclusive} • Acceptance that new processes and staff turnover is a good thing. {interviewee C1L1 to C1L14 excepting C1L8 and C1L12}	• Light management, but management can be depended upon for decisions when needed {interviewee C1O1to C1O31 excepting C1O21} • Co-operative structure {interviewee C1O1to C1O31 excepting C1O21} • Get out of the office e.g. visit clients and attend events {interviewee C1O1to C1O31 inclusive} • The feeling that the TTO is independent of the larger university management structure. {interviewee C1O1, C1O4, C1O8, C1O11, C1O18, C1O19 C1O22, C1O21, C1O23, C1O24, C1O28}

Table 3. Attitudes of staff in category 2 universities.

Category 2, leading TTO staff	Category 2, operational TTO staff
• Reliable staff have been in post for some time, maybe decades. {interviewee C2L3, C2L1} • Strong management {interviewee C2L4, C2L5} • Everyone knows their place in the structure {interviewee C2L6} • Responsibilities are in individual job descriptions {interviewee C2L7, C2L2} • Management aligns TTO strategy with the university senior management. {interviewee C2L8, C2L1, C2L2}	• Decisions are made centrally, often with input from higher (vice-chancellor) levels. {interviewee C2O1, C2O2, C2O3} • Hierarchical structure. {interviewee C2O1, C2O2, C2O3, C2O4, C2O5, C2O6} • Staff are clear about what areas/topics they are responsible for. {interviewee C2O7, C2O8, C2O9, C2O10, C2O18} • Staff spend effort on organizing "entrepreneurial" type activities with students and academics. {interviewee C2O1 to C2O19 inclusive} • Expertise has traditions and boundaries. {interviewee C2O16, C2O17}

In addition to the themes presented in tables 2-3, all staff in both categories reported no or negligible rotation of leadership.

Illustrative direct quotes are presented below.

4. Conclusion

Ambidexterity (see e.g. March 1991) balances exploration and exploitation, thus allowing (in this case) the TTO to be both creative and adaptable yet continuing to build on more traditional methods of business. A typical example could be that initial contact with a client produces an exploratory response e.g. co-operative brainstorming solutions with networked colleagues before returning to the client to embark on an exploitation pathway. The converse may be hierarchical top-down "silo thinking" where leaders may accept traditional exploitation pathways

only, resulting in failure to reach optimal levels of success. Will et al (2019) used Markov Chain Monte Carlo methods to demonstrate the superior performance of ambidextrous hybrid management culture where employees at operative level have good decision-making skills and co-operate without onerous intervention from top management. The questionnaire (table 1) and the breakdown of tables 2 and 3 into staff categories, are thus directly aimed at elucidating the degree of ambidexterity in category 1 and 2 situations.

At the level of TTO management, the results presented here (table 3) appear to support the conclusion that in category 2 cases, the management strives to align TTO priorities with those articulated with the university senior management while a larger degree of ambidextrous freedom is seen in category 1 cases (table 2).

Lumping research and enterprise together is a common mistake that senior management makes, writing bids for e.g. KTP projects demands completely different skills from writing a journal paper {C1L1}

Indeed, the majority of responses from category 1 operational staff reported embeddedness in a lively outgoing environment where reflective experience can be exchanged between professionals in a network (Mellor, 2015).

I like to hire PhDs for enterprise work, they start with the analytical curiosity and then attend lots of networking events. They probably only last a few years in the job, but churn brings in new and up-to-date skills {C1L2}

In category 2 cases, respondents reported that operational staff may have been in place for significant lengths of time, they are active in defined areas and indeed these may be anchored in their job descriptions. In these category 2 cases their management strives to be aligned with the university hierarchy and their operations are often inward focussed.

For a long time the senior management opinion has been that our undergraduates should be "entrepreneurial" thus we spend large chunks of work time organizing "dragons den"-type student competitions, but economically very little seems to come out of it {C2L1}

Several employees have been here a significant time and are well-versed in how to respond to changes of direction in the senior leadership {C2L2}

Category 2 universities may superficially seem "entrepreneurial" by profiling student focussed events, but overall, the impression is that an "entrepreneurial university" highlights graduate start-ups etc and perhaps this aspect is aimed more at encouraging undergraduate recruitment. However, the impact of category 2 universities on the wider entrepreneurial ecosystem is negligible (Mondal and Mellor, 2025).

In terms of the larger entrepreneurship ecosystem and the actual national economic value, it is the more ambidextrous category 1 universities that have remarkably better and reproducible success in engaging with more mature firms and boosting their financial success (Mondal and Mellor, 2025). This is not to say that category 1 universities ignore student start-ups, just that their main focus is elsewhere, working with established firms.

Thus, it is a moot point as to whether those universities advertising to undergraduates as being "entrepreneurial" with activities leading towards graduate start-ups, are actually entrepreneurial? The results presented here and elsewhere (Mondal et al 2024, Johnson et al 2024, Mondal and Mellor, 2025) support the conclusion that the genuinely entrepreneurial university is a university with a more ambidextrous TTO (category 1 universities) and it is these universities that contribute significantly to the wider technology entrepreneurship ecosystem (e.g. Mondal et al 2023).

The sum up, results presented here and elsewhere (Mondal and Mellor, 2025) show that in the UK at least, the ability of a university co-operation to result in an economically rewarding legacy for associated firms, is not coupled to university size, age or reputation nor indeed to (co-)location (e.g. Kussainov et al, 2020), but a strong correlation exists with the degree of business ambidexterity in the TTO function.

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Conflict of interest

The author claims that the manuscript is completely original. The author also declares no conflict of interest.

Author contributions

The author was solely responsible for all aspects of the research including writing, review and editing.

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