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The potential to enhance and develop BIM capabilities of companies in the AEC sector through collaboration with third level institutions in knowledge transfer partnerships (KTPs)

Building Capabilities in Complex Environments

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Introduction

- The one key area that the construction industry and academia could benefit from is closer collaboration on BIM.
- The rapid evolution of BIM technology has highlighted the importance of research and development to improve knowledge of BIM.
- However, BIM is not just a technology; it is also a project management tool and process, which allows all project stakeholders to collaborate more efficiently and effectively than under traditional processes (Xianbo, 2017).

- The Lambert Report (2003) recommended that universities should develop knowledge exchange activities with industry in order to complement and stimulate teaching and research capabilities within the higher education sector.
- The research of Arayici, Egbu & Coates (2012) also established that within construction organisations learning was increased and there was a better shared understanding of BIM established through knowledge exchange.
- This has also encouraged innovation in the application of BIM in real-world projects (Jack & Cheng, 2015).

- Machado, Underwood & Fleming (2016) record that who that the aim of a BIM KTP is to ensure that a company has the expertise needed to operate in a BIM environment through the streamlining of processes, the reduction of duplication of information, ensuring control, and increasing efficiencies.
- This confirms the research of Eadie et al (2014) who observed that a KTP can facilitate more efficient implementation of BIM.
- Therefore, a KTP will establish best practice knowledge in BIM (Machado, Underwood & Fleming, 2016).

- With regard to innovation the research of Hope (2016) observed that Knowledge Transfer Partnerships (KTPs) have been identified as being very important.
- It is also important that innovation that is based on mutual interest and trust (Edwards, 2007).

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Outline of the KTP process

- Knowledge Transfer Partnerships (KTPs) have emerged as an important method of facilitating knowledge exchange.
- The KTP was created in the UK in 2003 as a government-led initiative to support and assist organisations.
- It is a formal relationship between a company and an academic institution, which will facilitate the exchange and transfer of knowledge, technology and skills.
- They arose from UK government economic policy that has pursued a strategy of encouraging the creation of an economy that is knowledge based (Edwards, 2007).

- The company requires to identify a core strategic need and in collaboration with the academic partner develop innovative solutions to address this need that will also assist in business growth.
- The partnership uses a recently qualified graduate known as an associate to work in the company generally for twenty-four months whilst being supervised by university academics.
- The KTP project will also involve an industrial supervisor and an academic who collaborate to share knowledge for mutual benefit.

- This allows members of the company to work with academics and the associate to resolve a business problem through the introduction of new technologies or management practices.
- UK governmental support for a KTP is provided through a subsidy for participating organisations.
- However, the subsidy is not entirely by the government.
- It requires a vested interest from the organisation when diffusing an innovation.
- Therefore, from a monetary aspect the KTP risk is shared between the academic institution, the government funding agency and the company.

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Potential benefits of KTPs to enhance BIM capabilities

- The potential benefit to a company of using a KTP to enhance BIM capabilities is to use the knowledge of the academic and associate to implement technology and processes to improve profitability and efficiency through:
    - Improving productivity.
    - Improving communication and collaboration.
    - Improving quality of operations.
    - Reducing costs.
    - Improving lead times.
    - Reducing duplication and/or obselescence.

- The potential benefit to an academic institution of using a KTP to enhance BIM capabilities is to use the knowledge of the company and associate to:
    - Enhance knowledge and experience of academic involved.
    - Improve teaching and learning resources via live case studies.
    - Potentially create future research and collaboration.
    - Develop engagement with employers at postgraduate level.

- The potential benefit to an associate of using a KTP to enhance BIM capabilities is to use the knowledge of the company and the academic to:
    - Enhance knowledge and experience.
    - Create opportunities to collaborate and network with stakeholders in BIM adoption/implementation/enhancement.
    - Provide a recognised and rigorous career development process.
    - Improve career opportunities.

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Barriers to successful implementation of KTPs to enhance BIM capabilities

- The core challenge for a BIM KTP is to change current work practices, processes and culture at an organisational level.
- This will enable more effective collaboration with supply chains and create whole life thinking.
- Therefore, the main barriers to successful implementation of KTPs to enhance BIM capabilities are:
  - Difficulties linked to control and delegation of responsibilities within the partnership.
  - Lack of communication and shared understanding.

- Lack of support by senior management within organisation.
- The influence of the structure and culture of the organisation towards innovation.
- Concerns regarding potential cost of process plus software and training costs and subsequent return on investment.
- Concerns with regard to confidentiality in the KTP agreement/contract.
- Facilitating the role of the associate within the organisation.
- Concerns regarding competence of associate to be involved.
- Reluctance of academia to get involved in knowledge exchange.
- Potentially ineffective dissemination and contexualisation of knowledge gained.

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Preliminary investigation and data analysis

- A preliminary electronic survey was issued to professional members within Northern Ireland on Linkedin.
- The survey was produced using LimeService.
- Using data analytics within LimeService, the results of the survey have been analysed to determine the means ranking of the key drivers and barriers to KTP as follows:
  - In total 19 surveys were completed and returned.
    - Construction companies 11 survey responses (58%).
    - Architectural and Surveying practices 7 survey responses (37%)
    - Engineering practices 1 survey response (5%).

- Knowledge of the KTP process:
  - The majority of the respondents (68%) had previous experience of KTP, but this ranged from excellent knowledge (4%) to limited knowledge (37%).
  - However, almost a third (32%) of the respondents had no previous or current experience of KTP.
  - Respondents that had both no and a limited knowledge of KTP totalled 69%, with a total of 31% of respondents having a fair, good or excellent knowledge.
  - This data highlights the need for academic institutions offering KTPs to do more to make the AEC sector aware of the advantages of engaging in a KTP.

- Knowledge of BIM:
  - The majority of the respondents had a fair knowledge in BIM (68%).
  - 16% had a limited knowledge.
  - 16% had a good knowledge.
  - It is important to note that no respondents felt that they had either no knowledge or excellent knowledge of BIM.

- Ranking of drivers to use a KTP to enhance BIM adoption
  - The highest ranked driver (moderate) was improved quality of operations.
  - The second highest ranked driver was improved collaboration.
  - Both enhanced communication and efficiency created by BIM implementation were ranked joint third.
  - Followed by increased productivity and access to new markets respectively.
  - The lowest ranking (slight to moderate driver) barriers related to reduced costs and increase in profit.
  - The findings suggests that cost is not a key driver with benefits of improved quality, collaboration and communication outweighing the cost of KTP implementation.

- Ranking of barriers to KTPs to enhance BIM adoption
  - The highest ranking barriers (moderate barriers) are the ability to effectively transfer the knowledge and the relative competence of the KTP associate employed.
  - Then lack of senior management support and the unknown costs.
  - These barriers suggest that there is still insufficient understanding on how KTPs operate and how knowledge is captured and utilised effectively.
  - The lowest ranking barriers (a slight to moderate barrier) included ICT literacy, return on investment and contractual issues.
  - The low ranking barriers indicates that technical, legal and financial aspects were not major deterrents in implementing a KTP for BIM adoption.

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Conclusion

- The preliminary survey it has highlighted there is a clear linkage between the levels of knowledge of KTPs within the AEC sector and the ranking of barriers to the use of KTPs to enhance BIM adoption.
- The survey as previously outlined recorded that a combined total of 69% respondents have limited or no knowledge of KTPs.
- This is reflected in the response to the main barriers to the use of KTPs to enhance BIM adoption being the ability of a KTP to effectively transfer knowledge, the competence of the associate appointed, the unknown cost and competing initiatives.

- Therefore, the survey has identified a clear need for the AEC sector to be better informed about the advantages of using the KTP process and confirms the research of Xanibo (2017) outlined earlier.
- This research identified the lack of adequate motivation within industry to change their current mindset and behaviour patterns which restricted effective utilisation of new knowledge such as BIM and its adoption.
- The preliminary survey also highlights and confirms literature in that academia need to be more proactive in promoting the advantages of the KTP process to the AEC sector to enhance BIM adoption.

- The preliminary survey has identified the requirement for a larger a survey across the AEC sector in Northern Ireland to obtain a more comprehensive range of detailed data to:
  - ❖ Identify how the KTP process can enhance BIM adoption within the AEC sector.
  - ❖ How it can be promoted and implemented more effectively.
- There is also the potential of carrying out a similar survey in the Republic of Ireland and to subsequently compare and contrast results.

- Within the island of Ireland companies and academic institutions can engage in knowledge exchange through a Fusion project with Intertrade Ireland.
- An important aspect of this scheme is that the academic institution a company is partnered with must be based in the opposite jurisdiction to the company.
- Further information on Fusion can be found at:

  http://www.intertradeireland.com/fusion/

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References

- Arayici, Y. Coates, P. Koskela, L. Kagioglou, M. Usher, C. O'Reilly, K. (2011) "BIM adoption and implementation for architectural practices", Structural Survey, Vol. 29 Issue: 1, pp.7-25.
- Eadie, R. Comiskey, D. McKane, M. (2014) “Teaching BIM in a multidisciplinary department”, Proceeding of Education, Science and Innovations, 2014.
- Edwards, T. (2007) "A critical account of knowledge management: agentic orientation and SME innovation", International Journal of Entrepreneurial Behavior & Research, Vol. 13 Issue: 2, pp.64-81.
- Hope, A. (2016) "Creating sustainable cities through knowledge exchange: A case study of knowledge transfer partnerships", International Journal of Sustainability in Higher Education, Vol. 17 Issue: 6, pp.796-811.
- Jack, C.P. Cheng, Q. L. (2015). A review of the efforts and roles of the public sector for BIM adoption worldwide. Journal of Information Technology in Construction (ITcon), Vol. 20, pp. 442-478.
- Machado, M, Underwood, J, Fleming, A. (2016) “Implementing BIM to Streamline a Design, Manufacture, and Fitting Workflow: A Case Study on A Fit-Out SME in the UK”. International Journal of 3-D Information Modeling Vol. 5 • Issue 3. pp 31 – 46.
- Xianbo Z. A scientometric review of global BIM research: Analysis and visualization Automation in Construction 80 (2017) pp 37 – 47.
- http://eua.be/eua/jsp/en/upload/lambert_review_final_450.1151581102387.pdf

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Thank you

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