

2023-06-26

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Ciara Walsh

Technological University Dublin, ciara.walsh@tudublin.ie

Gemma K. Kinsella

Technological University Dublin, gemma.kinsella@tudublin.ie

Julie Dunne

Technological University Dublin, julie.dunne@tudublin.ie

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Recommended Citation

Walsh, Ciara; Kinsella, Gemma K.; and Dunne, Julie (2023) "Case-Study: An Industry-Academic Engagement Study of the Brewing and Distilling Sector in Ireland," *Irish Journal of Academic Practice*: Vol. 11: Iss. 1, Article 2.

doi:<https://doi.org/10.21427/6ZTH-GE43>

Available at: <https://arrow.tudublin.ie/ijap/vol11/iss1/2>

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Case-Study: An Industry-Academic Engagement Study of the Brewing and Distilling Sector in Ireland

Cover Page Footnote

We would like to acknowledge the Enterprise Academy at TU Dublin for supporting this study. This research was conducted as part of a Convene fellowship. The Convene project is funded by the Human Capital Initiative via the Higher Education Authority. <https://www.tudublin.ie/connect/partnering-with-us/enterprise-academy/> We would also like to thank Professor Anne Greene and Dr. Kevin O'Rourke for their contributions.

An Industry-Academic Engagement Study of the Brewing and Distilling Sector in Ireland

Ciara Walsh^{1,2}, Gemma K. Kinsella², Julie Dunne²

Enterprise Academy¹, School of Food Science and Environmental Health²,

Technological University Dublin

ciara.walsh@tudublin.ie

gemma.kinsella@tudublin.ie

julie.dunne@tudublin.ie

Abstract

Industry-academic (I-A) engagement models refer to the collaboration between academic institutions and industry partners to co-create and develop educational programmes that are relevant and responsive to industry needs. This study consists of research conducted as part of a 5 month Convene fellowship. It examines aspects such as industry demand, training, competency, knowledge, research projects, and modes of delivery for a proposed Postgraduate Diploma (PgDip, 60 ECTS) and Master of Science (MSc, 90 ECTS) in Brewing and Distilling (B&D). This study used an I-A model to capture and collate sector specific feedback and priorities. This was achieved through 40 industry surveys and 28 stakeholder interviews, conducted between February and June 2022. Notably, this engagement model was found to effectively inform curriculum development, clarify industry skill-set expectations, and elucidate sector demands, challenges, knowledge gaps, and opportunities.

Keywords: Brewing; Co-creation; Distilling; Engagement; Enterprise; Industry.

Introduction

There are reports of Irish whiskey being distilled back as far as the 6th century, while brewing in Ireland is believed to go back as far as the Bronze and early Iron ages (IBEC, 2023a). Legend has it that St. Patrick had his own brewery, and that St. Brigid famously changed water into beer. Brewed and distilled beverages were a staple in the diet of many for centuries, quite often as an alternative to drinking (potentially) contaminated water. This renaissance industry, which has long been associated with Irish culture, folklore and heritage, has seen a marked resurgence in recent years. In fact, the Irish Drinks Industry is now a significant contributor to the economy, with many iconic Irish Drinks brands selling globally into 140 markets. Notably, this sector is estimated to be worth more than €2.6 billion p.a. to the Irish economy, sustaining approximately 92,000 employees (IBEC, 2023a). Ireland has a long-standing reputation for producing quality alcoholic beverages, such as whiskey and stout. This reputation, combined with the rising global interest in craft and specialty beverages, has positioned Irish breweries and distilleries as desirable players in the international market. Post-Covid, this sector is reported to be ‘booming’, with whiskey alone reaching €1 billion in exports in January 2023 (IBEC, 2023c), and the sector expanding by 25% over the last 4 years (DII, 2023).

However, despite this growth, there is a lack of accredited postgraduate programmes led by higher educational institutes (HEI) in this specialised area; with interested individuals travelling abroad to complete taught postgraduate qualifications. While historically many brewers and distillers learnt informally through ‘on-the-job’ training, the alternative of formally accredited programmes provides the opportunity to explore the scientific principles that underpin both the brewing and distilling (B&D) processes. Moreover, this technical syllabus can be complemented with modules such as product development, regulation,

business, and innovation - to ensure graduates have a comprehensive skillset for employment in future sector roles (Waechter-Brulla & Woller, 2000). Furthermore, by combining formal education (and continuous professional development) with experiential learning, students can apply their theoretical knowledge in real-world settings, gain valuable skills sets, and industry-specific insights. This in turn improves technical knowledge, competency and expertise; helping to drive growth and innovation in the sector (EFT, 2013).

For the learner, it can also create opportunities to build peer (and potentially collaborative) networks, further develop professional (transferable) skill sets, and improve career advancement prospects. While the individual, economic and societal benefits of life-long learning are well-documented (Dorsett *at al.*, 2010; Laal, 2012; Irish Government 2022, European Commission 2023), the drinks sector current demand for employees highlights a very immediate need for skilled graduates in this area. In fact, the recent strong growth in the beverage sector is aligned with the creation of a predicted 23,000 new jobs in Ireland in the coming years (Skillsnet, 2018). Thereby highlighting the need for accredited programmes to support upskilling and reskilling of employees, and potentially, the further growth of this sector.

Overview of B&D Qualifications in Ireland and UK

TU Dublin launched the first taught postgraduate programme in B&D in Ireland from a HEI (a part-time PgCert, 30 ECTS, 16 places) in Sept. 2022, which was funded by the Higher Education Authority *via* Springboard (TU Dublin, 2023a; HEA, 2022). This project was supported by the Enterprise Academy (Enterprise Academy, 2023) at TU Dublin: a business entity who work in the co-development of accredited talent solutions for enterprise, and are a product of the Human Capital Initiative Convene project (Convene, 2023). This PG

Certificate consists of technical modules in B&D, coupled with product development, entrepreneurship and innovation. While this programme creates opportunities for students to upskill/reskill for sector employment, the complementary alignment of technical and business modules assists participants in developing their business acumen to (potentially) start their own business. This PG Certificate also includes a work practice module, which allows students to complete a >6 week placement in a new or existing (if they already work in the industry) B&D company. This programme was heavily oversubscribed - indicative of a clear and pronounced need for further postgraduate training in this area.

In addition, the Department of Chemistry, in Maynooth University also released a micro-credential (level 9) in B&D in Spring 2023, with a key focus on analytical skills and their interpretation to meet an industry demand for such skills (MU, 2023). While undergraduate level 5-8 programmes in B&D are available nationally, the provision of taught level 9 programmes in this area has only recently been explored. In fact, Irish students typically travel to HEIs abroad (such as Heriot-Watt University in Scotland) to obtain postgraduate qualifications. Heriot-Watt University has been teaching B&D since 1903, so has a well-established tradition of educating aspiring brewers and distillers (Heriot-Watt University, 2023). They offer level 9 programmes such as an ‘MSc in Brewing & Distilling’, and an ‘MSc in Brewing and Distilling and Entrepreneurship’. Notably, no taught MSc in B&D is currently available in Ireland from any HEI. Additionally, Heriot-Watt’s programmes are professionally recognised by the Institute of Brewing and Distilling (IBD). The IBD was established in London in 1886, has an expansive world-wide membership, and is considered an industry gold-standard for online education in this area (IBD, 2023). It offers 4 levels of training and examination in Brewing/Distilling: Foundation, General Certificate, Diploma or Masters (i.e. to be a Masterbrewer or Masterdistiller), which can all be completed remotely,

online. Similarly, the Wine and Spirits Educational Trust (WSET) has several levels of awards (1 or 2 in saké, 1-3 in spirits and 1-4 in wine) which can also be completed online; typically for those working in the hospitality or the drink industry (WSET, 2023).

With regard to the provision of undergraduate programmes, a B&D stream option (coupled with a separate food stream option) was introduced into the third year of the BSc (Hons) in Food Innovation (level 8) in TU Dublin in 2017 (TU Dublin, 2023b). This was the first programme in TU Dublin which specialised in B&D, and includes technical, regulatory, and product development modules with a specific focus on the beverage sector. Furthermore, students who select this B&D stream must fulfil a 12-week work placement (with the option of completing an internship of up to 7 months) in a related company in third year. While final year projects (4th year) can be completed on campus, many students choose to return to their previous placements to complete this component and work on solving real-life industry challenges. Projects have included quality control issues (i.e. such as variation in grain quality), technical research (i.e. examination of the relationship between colour and pH change during fermentation) and sustainability projects (i.e. valorisation of spent grain); with many graduates continuing in full employment in these companies on completion of their BSc.

In 2016, the Institute of Technology Carlow (now South East Technological University) introduced a full 'BSc (Hons) in Brewing and Distilling' (SETU, 2023). This degree programme focuses on the scientific and engineering principles of malting, B&D as well as quality control, biochemistry, microbiology, new product development, law, innovation and entrepreneurship. This programme is closely linked to industry and graduates typically enter the drink sector, undertake further postgraduate study, or start up their own businesses. This

BSc also includes a 16 week work-based learning module, and an industry focused final year (laboratory) research project. Notably, this programme has been awarded professional recognition by the Institute of Brewing and Distilling (IBD) and provides graduates with access to the 'Master level' professional qualifications from the IBD.

Another programme of note, is the 'Certificate in Brewing and Distilling' (level 7, 1.5 years) available from Munster Technological University (MTU, 2023). This programme requires at least a level 6 qualification on the NFQ framework or an IBD General Certificate in Brewing or Distilling for admission. This MTU certificate is reported to be aligned with the IBD Diploma in Brewing and the IBD Diploma in Distilling. Finally, there is a Certificate in Brewing Industry Skills (level 5, 1 year) offered by the Bray Institute of Further Education, which prepares students to work as a brewing/distilling technician on completion (BIFE, 2023).

Industry-Academic Engagement Model

With regard to this study, an Industry-Academic (I-A) engagement model was used to complete a sector learning need analysis, and to explore the prospect of developing taught postgraduate programmes in B&D in TU Dublin - as none were available in Ireland at this time (Spring 2022). In more general terms, Industry-Academic (I-A) engagement models are based on the premise that each partner has a complementary strength that can be harnessed for mutual benefit (Perkmann & Walsh, 2009; Tartari & Breschi, 2012). Academic institutions possess a wealth of theoretical knowledge and research capabilities, while industry collaborators have practical insights and real-world experience (ETF, 2013). From this perspective, I-A partnerships have a greater ability to tackle complex problems, develop innovative solutions, and drive technological advancements (EFT, 2020). Moreover, such

engagement plays a key role in bridging the gap between academia and industry, and ensuring that third level programmes are comprehensive, relevant, and produce ‘industry-ready’ graduates (Culkin & Mallick, 2011).

In more specific terms, I-A engagement models have been used to improve the quality of programmes in other educational institutions in Ireland and elsewhere (Lucia *et al.*, 2012; Clarke, 2017; Wrigley *et al.*, 2020; Barnacle *et al.*, 2020; Doyle *et al.*, 2022). This I-A engagement project was a case study conducted as part of a Convene fellowship (Convene Project, 2023) to co-create further stackable postgraduate programmes with industry to meet this identified skills deficit (DAFM, 2015; INSS, 2019; DII, 2023).

Research Design

Case study methodology is best described as an in-depth exploration of intricate phenomena within a specific context (Payne, 2020). The ‘traditional model’ of surveys and stakeholder interviews were selected to complete the sector learning needs analysis and explorative study (Markaki *et al.*, 2021). Notably, more than one tool is recommended for such research to enhance the validity of the findings (Yin, 2008; Skillsnet, 2021). Surveys typically generate quantitative data (capturing trends, patterns, and correlations), and interviews qualitative data. The latter can create context, and a deeper understanding of the participants' knowledge, perspective, reasoning, and beliefs. Combining both methods provides a more comprehensive and holistic overview (Sammons, 2010).

Yin *et al.* (2014) suggests that case study research is an integral method for programme evaluators to consider, and that data collection should be iterative. This allows for the further refinement of research questions and the exploration of emerging themes (Dawson, 2008;

Stake, 1995). To this end, the survey results will inform the semi-structured interview themes (or talking points) in a sequential order, to highlight areas where further investigation is required. The methods used to complete this I-A engagement model are described in the methods section, and data obtained has been used to inform (and will continue to do so) the development of stackable programmes in B&D in TU Dublin.

Stackable programmes were selected as they are preferential for industry-based learners; as they are agile, flexible and allow for self-paced learning (Austin, 2012; Marcus, 2020). Moreover, this incremental model allows the learner to customise their learning pathway based on their needs, interests, and career goals (Wheelahan & Moodie, 2022).

Methods

Industry Surveys

This I-A engagement model consisted of an online survey and semi-structured stakeholder interviews. The surveys were created on Google Forms and collected anonymously between February and June 2022. Survey promotion took place *via* linkedin and by emailing all the breweries and distilleries operating in Ireland to request their participation. In brief, the survey consisted of 29 questions and was completed by a total of 40 respondents. It focused on the following key areas:

- a) Current staff training (internal and/or external);
- b) Company support/interest in postgraduate training of staff in brewing and distilling (B&D);
- c) Perceived obstacles to training and upskilling;
- d) Examination of methods of programme delivery (full-time, part-time, online, blended, on campus etc);

- e) Examination of industry demand for a PG Diploma in B&D, and competencies and knowledge expected of graduates;
- f) Examination of an industry demand for an MSc in B&D, with a focus on the logistics of provision of a research project (in industry, on campus or a hybrid of both);
- g) Priority transferable skills (graduate attributes) for roles in this sector.

Notably, expected competencies and knowledge (e) were presented on 2 different lists; with headings which could be ranked 1-7; with 1 being ‘none at all’ and 7 being ‘very proficient in this area’. Competencies were defined as ‘demonstrable skills in...’, and knowledge as ‘theoretical and/or practical understanding of...’. Comparable taught postgraduate programmes in UK universities in B&D (none previously available in Ireland) and online provision from the Institute of Brewing and Distilling (IBD) were reviewed; and data captured used to populate competency and knowledge lists. The final lists were further reviewed and added to by industry experts/consultants. Respondents were also asked if they believed any additional area (not listed) should be considered for inclusion, and supporting feedback was captured *via* this measure.

Stakeholder Interviews

In addition, 28 stakeholder interviews were conducted as part of this study. These included meetings with employees working in a range of different Irish macro and micro companies (including directors, head brewers, distillers, heads of training etc), industry representatives and also regulators. Based on the survey findings, the interviews structure focused on discussion under the following 5 themes to provide further context and perspectives on:

- a) Current training provision;
- b) Industry need for postgraduate programmes in B&D;

- c) Current sector challenges;
- d) Knowledge Gaps/Deficiencies;
- e) Current sector opportunities.

The findings of industry surveys and stakeholder interviews are described in the findings section.

Findings

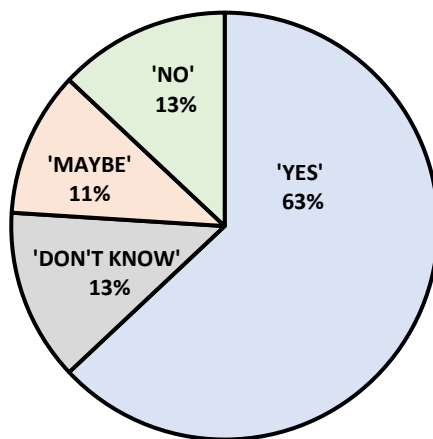
Industry Surveys

The industry surveys were completed by brewers (including interns, cellar brewers, brewery managers, and masterbrewers), distillers (including distillery managers and masterdistillers), and individuals working in other drink sector roles (quality, operations, sales and marketing, research and NPD, company trainers and directors). Sixty seven percent (n=27) reported that employees in their organisations had the opportunity to receive external training, while 33% (n=13) indicated the provision of in-house training in their company - in the form of on-the-job training and internships. The former consisted of online programmes with the IBD (n=25, 63%), with some reporting additional opportunities to study to MSc level in universities in the UK (n=3, 8%), WSET spirit training (n=1, 0.4%) and the possible availability of role specific ‘other’ training (n= 5, 13%) i.e. sales, marketing, tourism, regulation, engineering etc. Notably 63% (n=25) believed there would be an interest in the provision of postgraduate training in B&D from staff in their company if provided by a HEI (Figure 1(a)).

With regard to obstacles to training, 1 in every 2 individuals noted ‘time’, 1 in every 5 ‘cost’ and 1 in every 5 the ‘lack of suitable programmes’- as per Figure 1(b). Respondents were given the option to describe barriers to training in a follow-on question (if they so wished).

Notably, location i.e. ‘not near a college’ (29%, n=7), and ‘shift work’ (25%, n=6), were cited as the two most prominent issues for employees in this regard.

1 (a) 'Do you think there would be INTEREST from staff in your company in a POSTGRADUATE DIPLOMA in Brewing & Distilling from a 3rd level Institution in Ireland?'



1 (b) 'What are the biggest OBSTACLES for staff in your company in completing FURTHER TRAINING/UPSILLING?'

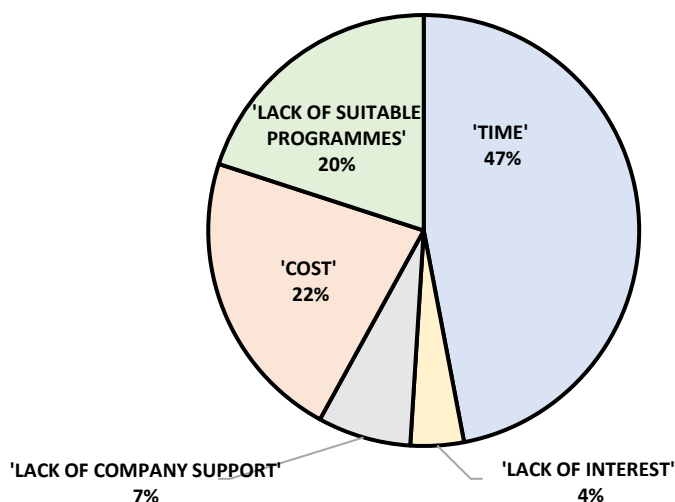


Figure 1 (a) & (b): Examination of Postgraduate Diploma ‘Interest’ and ‘Obstacles’ in an Online Drinks Sector Employee Survey collected anonymously between February-June 2022 (n=40)

When asked about delivery of new postgraduate programmes in B&D, 50% (n=20) of drinks sector employees indicated that these should be provided as both full-time and part-time options to interested candidates. While 45% (n=18) only saw a need for part-time programmes, and 5% (n=2) proposed full-time provision only. In more specific terms, 53%

(n=21) of respondents requested that all lectures be ‘online and recorded’, while 35% selected a ‘blended’ approach - described as a mix of online and face-to-face classes. Due to the scientific nature of these programmes, practical class inclusion in laboratories on-site were proposed with both the former and latter options (as per Figure 2). However, respondents reported a preference (42% overall) for laboratory sessions to be blocked i.e. a week or more during term (rather than weekly); independent of the method (online, blended etc.) of lecture delivery proposed. Support for the provision of programmes completely onsite (9%, n=5) or completely online i.e. no practical classes (3%, n=2) was low.

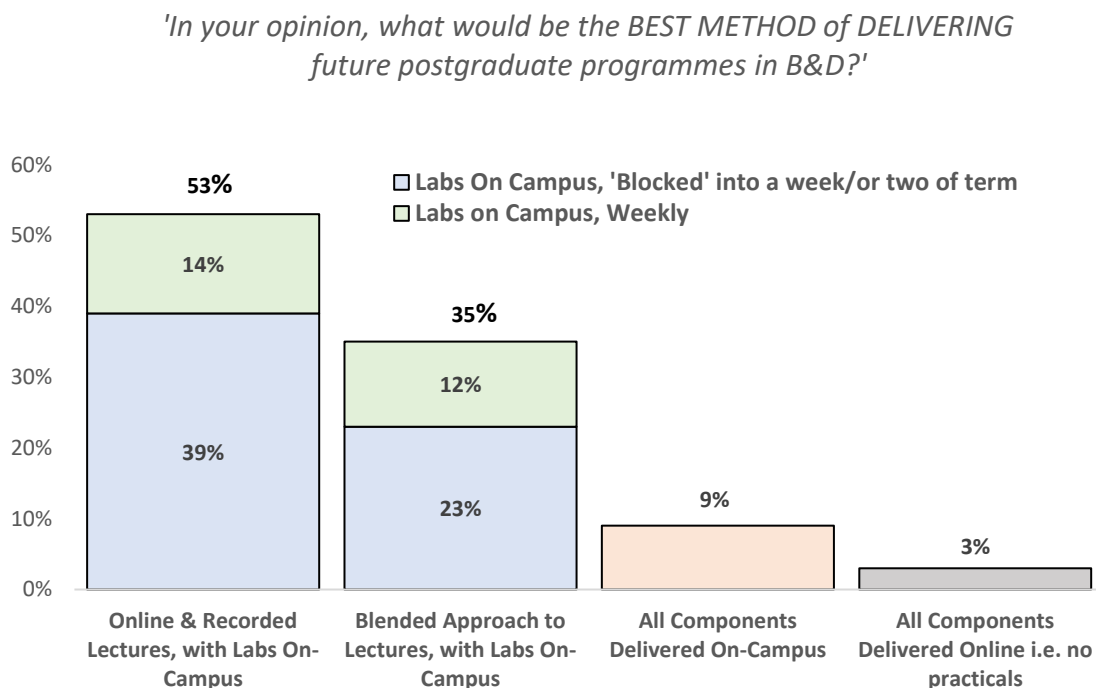


Figure 2: Examination of Postgraduate Programme Delivery in an Online Drinks Sector Employee Survey collected anonymously between February – June 2022 (n=40)

When expected ‘competencies’ for a Postgraduate Diploma in B&D were examined, technical aspects of brewing/distilling (86%/84%), hygiene control and cleaning (85%), quality assurance (83%) and process monitoring (81%) were ranked the 5 most important from the list presented; with other areas prioritised to varying degrees (Table 1). While raw

materials (86%), beverage process technology (81%), beverage microbiology/biochemistry (80%), sustainability (76%) and beverage regulatory affairs (74%) were ranked as the most important with regard to 'knowledge'. Respondents were also asked which additional areas (not listed) should be considered. Notably, 5 (12.5%) proposed 'Health and Safety' (including ATEX*), 4 (10%) 'Customs and Excise/ Revenue', 3 (7.5%) labelling legislation, 2 (5%) lean manufacturing, and 2 (5%) cask management and warehousing. Others (each mentioned once) included: dispense technology, zero alcohol production, HACCP, allergens, automation systems information, tourism, and shelf-life analysis. The proposed priority ranking of 'competencies' and 'knowledge' will help inform the development of the curricula of further postgraduate programmes in B&D for TU Dublin.

*The term "ATEX" applies to atmospheres that are potentially explosive due to the possible presence of dust, vapours or gases that are likely to ignite or explode.

Rank	COMPETENCIES	Average (1-7)	Medium (1-7)	Percentage
1	Technical Aspects of Brewing	6.00	6	86%
2	Hygiene Control & Cleaning	5.94	6	85%
3	Technical Aspects of Distilling	5.89	6	84%
4	Quality Assurance Procedures	5.80	6	83%
5	Process Monitoring & Operations	5.66	6	81%
6	Sampling	5.49	5	78%
7	Traceability	5.46	5	78%
8	Scheduling	5.09	5	73%
9	Sensory Analysis	5.08	5	73%
10	Bottling Line Operations	4.60	5	66%
11	Canning Line Operations	4.40	4	63%
12	Cellar Management/Draft Dispense	4.31	4	62%
13	Keg Filling Operations	4.26	4	61%
Rank	KNOWLEDGE	Average (1-7)	Medium (1-7)	Percentage
1	Raw Materials	6.00	5	86%
2	Beverage Process Technology	5.69	6	81%
3	Beverage Microbiology/Biochemistry	5.61	5	80%
4	Sustainability	5.29	5	76%
5	Beverage Regulatory Affairs	5.2	5	74%
6	Product Development	5.11	5	73%
7	Project Management	5.09	5	73%
8	Supply Chain	4.83	5	69%
9	Equipment Maintenance	4.69	5	67%
10	Innovation & Entrepreneurship	4.54	5	65%
11	Packaging Management	4.51	4	64%
12	Beverage Marketing	4.34	4	62%
13	Financial Management	3.94	4	56%
Rank	TRANSFERABLE SKILLS	Average (1-7)	Medium (1-7)	Percentage
1	Attention to Detail	6.29	6	90%
2	Ability to work Independently	6.26	6	89%
3	Team work/Relationship Building	6.12	6	87%
4	Adaptability	6.03	6	86%
5	Critical Thinking	5.99	6	85%
6	Communication Skills	5.97	6	85%
7	Problem-solving	5.96	6	85%
8	Organisation & Planning	5.65	6	81%
9	Initiative	5.56	6	79%
10	Project Management	5.44	6	78%
11	Writing Skills	5.26	5	75%
12	Leadership	5.24	5	75%
13	Creativity	4.97	5	71%

* Competencies defined as 'demonstrable skills in an area' and knowledge as 'theoretical and/or practical understanding of an area'

Table 1: Examination of Competencies, Knowledge and Transferable Skills of a Postgraduate Diploma in B&D on a scale of 1-7 (1: 'none at all' to 7: 'very proficient in this area') in an Online Drinks Sector Employee Survey collected anonymously between March – May 2022 (n=40)

Notably, attention to detail (90%), ability to work independently (89%), team work (87%), adaptability (86%), critical thinking (85%), problem solving (85%) and communication skills (85%) were ranked as the top transferable skills; with others prioritised to varying degrees - as per Table 1. Respondents were also asked which additional transferable skills (not listed)

should be considered. Professionalism and the ability of graduates to present themselves well (formally and informally) in front of clients was noted (n=3, 7.5%), and so too were networking/social skills (n=2, 5%). In addition: time management, responsibility, an inclusive approach, ethics/ morality, system-thinking and decision-making skills were proposed (each mentioned once). Priority ranking of these transferable skills will assist in the development of assessment strategies in the proposed postgraduate programmes, in order to prepare students for future roles in this sector.

Do you think there would be INTEREST from staff in your company in a POSTGRADUATE MSc in Brewing & Distilling from a 3rd level Institution in Ireland?'

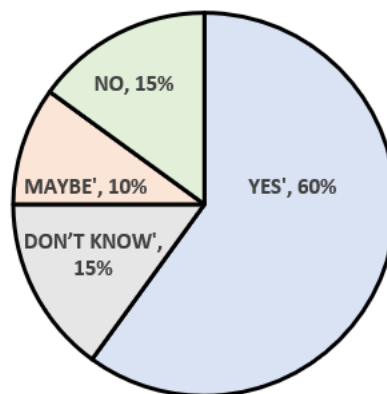


Figure 3: Examination of Postgraduate MSc in Brewing & Distilling 'Interest' in an Online Drinks Sector Employee Survey collected anonymously between Feb – June 2022 (n=40)

In addition to consideration of a 60 ECTS postgraduate programme in B&D, a 90 ECTS (with an additional 30 ECTS research component) was examined. When respondents were queried regarding this programme, 24 (60%) of drink sector employees believed there would be an interest in an MSc in B&D from staff in their companies, with 6 (15%) indicating no interest. Individuals surveyed were also asked for their opinion on the location of completion of a MSc research project. Notably, 47.5% proposed a company placement, 25% believed it should be on campus, and 27.5% suggested that either option would be acceptable. However, only 30% (n=12) of respondents believed their company could support completion of a research project in-house, with an additional 33% 'not sure'. This suggests a need for

flexibility regarding whether a research project is completed in industry or on-campus. Furthermore, some respondents commented on the need to access campus equipment, suggesting consideration of a hybrid model in many instances. Interestingly, no respondent selected a desk-based project as an acceptable research option for the proposed MSc in B&D, highlighting the perceived 'hands-on' nature of roles in this profession.

Stakeholder Interviews

Interviews were conducted with 28 stakeholders, and there was a general consensus (100%) among interviewees that the sector was underserved by Irish third level institutions; as no dedicated taught postgraduate programmes in B&D were offered in Ireland at this time (Spring 2022). This is in agreement with the industry interest in formal accredited training, elucidated in the online surveys. Notably, the interviewees in many cases described how aspiring brewers and distillers had to travel to the UK to seek a taught postgraduate qualification from an HEI. From this perspective, the development of new postgraduate programmes by a HEI in Ireland was welcomed by participants. Online accredited programmes from the IBD were agreed as the most popular method of training currently. The interviewees reported that such programmes were accessible, stackable, and allowed for flexible learning. They also described them as well-developed, of high quality, and well-recognised in Ireland and the UK. They do however lack a practical component (as they are fully online), so the provision of practical classes aligned with lectures was seen as a benefit and a unique offering of the TU Dublin proposed postgraduate programmes. While many companies provide internships and in-house training to employees, interviewees noted a sector need for formal and accredited educational options for upskilling and reskilling to meet industry demand and to support the rapid growth of this sector.

Current drink sector challenges were discussed in detail with interviewees, to further inform curricula development. The following 7 topics (listed in Table 2) were raised by stakeholders in most interviews conducted, with 1) to 5) aligning with the priority areas revealed in the survey findings as per Table 1. Similarly, knowledge gaps reported by stakeholders interviewed were also aligned with areas 1) to 5).

- | |
|---|
| <ol style="list-style-type: none"> 1) Revenue and regulatory compliance – a general lack of understanding and challenges meeting compliance were reported 2) Health and safety compliance – particularly with regard to ATEX, and health and safety concerns were even more pronounced for breweries with a tourism arm. 3) Meeting sustainability goals – a lack of knowledge on how to amend current traditional processes to be more sustainable, specialist experts in this field required 4) Technical, innovation and packaging developments – important in order to follow market trends and to ensure the low/no alcohol products were shelf-life stable 5) Supply chain security – affecting every aspect of the sector from raw material through to glass bottles, future concerns also with regard to the impact of climate change 6) Increasing utility costs – reported as an issue for small, medium and large businesses 7) BREXIT – concern regarding the potential for trade issues, disruption, and increased costs |
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Table 2: Challenges raised by Drink Sector Stakeholders during interviews conducted between Feb – June 2022 (n=28)

Ireland has a long and rich history of alcoholic beverages and is associated with many iconic drinks brands. This has underpinned the steady growth experienced by the sector in recent years, with increasing demand for Irish drinks evident both domestically and internationally. This strong growth, coupled with a demand for skilled graduates, was reported as a key opportunity by interviewees in this study. Others included new innovations, and product experimentation (low and no alcohol trends, flavoured beers, premiumisation etc.), which has led to a more unique and diverse product offering - appealing to a wider range of consumers. Interviewees were also keen to explore opportunities to produce more sustainable products and packaging going forward. The findings of the online survey and stakeholder interviews, and how they build on each other is described in the discussion.

Discussion

The I-A engagement study noted a clear industry agreement in the need for taught postgraduate programmes from HEI's in this area. More specifically, all interviewees advocated for the development of the proposed programmes, with 60-63% of individuals surveyed believing there would be demand for such qualifications from staff in their company, and 20% reporting a 'lack of suitable programmes' as an obstacle to training. This is in agreement with a reported national skills deficit and a recognised need for more formal opportunities for learning in B&D from various sources: Foodwise Strategy 2025 (DAFM 2015), Ireland's National Skills Strategy 2025 (INSS, 2019), and a drinks industry report from DII 2023.

Notably, this I-A engagement study was able to capture a heavy industry reliance on online and in-house training of employees in the Irish drinks sector. Flexibility in delivery, and a high-quality provision were reported regarding the former. However, online programmes tend to focus on practical and administrative functions as oppose to the overall student experience (McAvinia, 2017); a feature noted by many interviewees in this study. Moreover, the lack of accompanying laboratory components was seen as a key disadvantage by interviewees with the delivery of solely online programmes. This is particularly true for a 'hands-on' profession (such as brewers and distillers), where equipment familiarity, competency and proficiency are important; and arguably necessary to ensure 'industry ready' graduates. In-company training was also reported to be a prominent method of upskilling employees in the drinks sector in this study. However, the surveys did not focus on capturing more detail on in-house training, to examine its depth, content, and frequency. Given that 33% of those surveyed reported availability of informal training within their company, further exploration of this component would have been beneficial.

With regard to programme delivery, this I-A engagement model captured a clear industry demand, for non-traditional methods of lecture delivery (Figure 2); with 47% of individuals surveyed reporting ‘time’ as the biggest obstacle to continued training (Figure 1b). Other I-A studies have also reported that enterprise seek an interactive, agile and flexible approach to formal education (Kettunen *et al.*, 2022; Stewart & Bishop, 2022). This is best achieved through the incorporation of technologies to ensure that these programmes are attractive and accessible to industry-based candidates (Singh, 2021; Boylan *et al.*, 2022; Weatherby *et al.*, 2022).

From this perspective, a HyFlex approach (encompassing, face-to-face, live streamed and recorded) lecture material for the theoretical components was proposed for the new postgraduate programmes in TU Dublin. This will be coupled with the on-site delivery of laboratory components (with blocked delivery preferable if possible - as per Figure 2), so that the full complement of sector demands have been met in this regard (Waechter-Brulla & Woller, 2000; Pelter, 2006). Notably, consideration to both individual and team-based assessments, with a strong focus on attention to detail, problem-solving and communication skills (as per Table 1) will assist in building the graduate attributes sought for roles in this sector. Similarly, insights with regard to the proposed MSc research projects were captured, and highlighted the need for a degree of flexibility in their design and application, with consideration to small, medium and large enterprise. Moreover, stakeholders also noted the need for these research projects to be focused on solving real-life industry problems - the benefits of such forms of authentic assessment have been previously documented (Perez, 2021; Kettunen *et al.*, 2022; McArthur, 2022).

Furthermore, the selection and prioritisation of competencies and knowledge will directly inform curricula development of the proposed new programmes. Survey and interview results were aligned in this regard, and desired technical competencies for inclusion were clearly outlined - as per Table 2. Both the surveys and interviews highlighted other notable areas for consideration (not specifically proposed in the presented survey lists); these were sustainability, revenue compliance, and health and safety.

With regard to sustainability, a lack of sector specific knowledge was described, indicating the importance of embedding associated knowledge and competencies in this area in the proposed curricula. Challenges with revenue compliance and understanding of regulatory components also featured strongly, and have been previously described by DIGI (2018). As a result, TU Dublin are in discussions with Revenue regarding a collaboration in the delivery of content on the new programmes to meet this need. Lastly, health and safety was proposed as a priority area in both the surveys and stakeholder interviews, highlighting the importance of its adequate inclusion in the curriculum. On a positive note, a thriving marketplace, new innovations, and a demand for skilled employees were reported, and are reflective of many new and emerging opportunities in a growing sector (IBEC 2023a, IBEC 2023b).

Conclusion

I-A engagement models facilitate enterprise and academic collaborations to enhance teaching, research, and innovation (Walsh *et al.*, 2016; Henningsson & Geschwind, 2019; Horan, 2020; Williams, 2021 Jackson *et al.*, 2021). It elucidated an industry interest in taught postgraduate programmes from a HEI in Ireland in B&D, which up until recently were not available. It also highlighted priority areas for the development of such postgraduate programmes, including knowledge, competencies and transferable skillsets. This dataset was

further informed by the 28 stakeholder interviews, which agreed (and expanded on) the survey findings, giving a more in-depth and comprehensive overview. This I-A engagement study will allow the drinks sector to play a key role in the future co-development of all aspects of the new PG Diploma and MSc in B&D – yet to be validated.

While challenges and limitations in I-A models have been previously documented (Hora, 2020; Bjursell & Engstrom, 2019; Menon *et al.*, 2021; Williams, 2021), this engagement study offered invaluable insights and perspective in this sector specific scoping exercise. This will assist in aligning enterprise and academic expectations and goals going forward. In addition, the collaborative process also served to nurture new and existing I-A relationships, expand networks, and grow symbiotic partnerships for TU Dublin. Finally, it is hoped that this engagement at the developmental stage of this project will grow TU Dublin's profile, reputation, and associated graduate employability in the Irish beverage sector (as reported in other similar I-A studies: FitzSimmons, *et al.*, 2020; Dunne *et al.*, 2021; Doyle *et al.*, 2022), while also seeding similar future I-A collaborations.

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